Administration of

the School Building Program

McGRAW-HILL SERIES IN EDUCATION

Harold Benjamin, Consulting Editor-in-Chief

ARNO A. BELLACK
Teachers College, Columbia University
CONSULTING EDITOR
CURRICULUM AND METHODS IN EDUCATION SERIES

HAROLD BENJAMIN
Director, Connecticut Study, Role of the Public School
CONSULTING EDITOR
FOUNDATIONS IN EDUCATION SERIES

HARLAN HAGMAN
Wayne State University
CONSULTING EDITOR
ADMINISTRATION IN EDUCATION SERIES

NICHOLAS HOBBS
George Peabody College for Teachers
CONSULTING EDITOR
PSYCHOLOGY AND HUMAN DEVELOPMENT SERIES

ADMINISTRATION IN EDUCATION

Harlan Hagman, Consulting Editor

MORT, REUSSER, AND POLLEY · *Public School Finance*
STREVELL AND BURKE · *Administration of the School Building Program*

Administration of the School Building Program

WALLACE H. STREVELL

Chairman, Department of Administration and Supervision, College of Education, University of Houston

ARVID J. BURKE

Director of Studies, New York State Teachers Association

McGRAW-HILL BOOK COMPANY, INC.

1959 NEW YORK TORONTO LONDON

ADMINISTRATION OF THE SCHOOL BUILDING PROGRAM

 Library of Congress Catalog Card Number 59-8566

Preface

This book is written for the person preparing to be a school administrator and for the administrator on the job who is attempting to reexamine his perspective or improve his practices in dealing with school-plant problems. Although it is not intended primarily for specialists, architects, or plant managers, for whom an impressive literature already is available, the text should prove a helpful reference for them. It is particularly suited to school-board members and others responsible for policy making and decisions.

The responsibility for school-plant programming rests largely with local school authorities. Smaller school systems, through lack of resources or standards or both, have tended to operate often without the aid of the best professional leadership and with only meager specialist service. Larger school systems, with certain exceptions, have tended to utilize the services of a corps of specialists and the guidance of well-prepared professional leaders. Anticipating this variety of conditions, the authors sought to place primary emphasis on how the school administrator can locate needed technical information, how he can utilize specialists wisely, and how he should weigh their contributions in terms of all relevant factors to arrive at sound decisions.

The authors became concerned with these problems of planning and decision making with respect to the school plant when both were employed as consultants to the New York State Commission on School Buildings. They felt the need for a treatise on school-plant problems written especially from the perspective of the school administrator, who, although he may not himself be a specialist, has the task of weighing the recommendations of all types of specialists and finding procedures that will have the greatest effectiveness in the total operation of his school system both now and in the future. The materials for this text were gathered over a period of years. They have been tested in university

classes in school administration and applied in numerous surveys and studies of school problems.

The demands of specialization with respect to physical facilities, like any other form of specialization in education, pose serious policy decisions. To what extent, for example, may the present plant really be detracting from the effectiveness of staff performance or the quality of educational offering? How far could the physical facilities be expanded and improved without risking fiscal encroachment upon the resources for staffing, for materials of instruction, and for educational quality itself? How may available funds for plant construction best be allocated or budgeted in terms of space? Such problems as these suggest but a few of the basic decisions that have to be made in any school system.

In addition to making preliminary decisions and preplanning, the professionally trained school administrator is expected to be proficient in the work flow of the school-plant program itself. This includes such necessary tasks of school administration as developing standards, evaluating the present facilities, surveying needs, planning programs, maintaining public relations, developing educational specifications, dealing with architects and other specialists, attaining efficiency and economy in approval of design and contracting procedures, seeking better construction methods and materials, equipping the plant, budgeting the costs, solving financial problems, handling legal problems, and achieving satisfactory utilization and maintenance. For this purpose the text introduces ample technical material, developed by specialists, which will be generally applicable and not subject to much change.

Accordingly, the book is divided into three parts. Part One is devoted to the major policy decisions involved in providing a school plant. Part Two deals with the major responsibilities of the school administrator as they relate to studying the needs and formulating program recommendations. Part Three is devoted to the administration of school-facility projects.

The authors are indebted to the research and scientific contributions of many specialists. They hope that this book will fulfill its purpose and that it will aid in improved decision making and better administration of school-building programs and projects.

Wallace H. Strevell
Arvid J. Burke

Contents

PART THREE. PROJECT ADMINISTRATION

PART ONE

Policy Decisions

CHAPTER 1

Need for School Facilities—Administrative Perspective

Providing needed school facilities in a school system, even in a very small school system, is a complex administrative responsibility. The complexity is the result of a number of factors: the fact that facilities have to be planned for future use, the many considerations affecting the utility of school plants, the complexity of modern school facilities, and the far-reaching effects of decisions once translated into land and improvements, particularly where the financing will be extended over a long period of time. Primary responsibility for recognizing these critical decisions, and when they should be made, must be assumed by the chief administrative officer of the school system. As an educational leader he must provide the school authorities and the supporting public not only with proper recommendations but also with the resources and plans that will enable them to make sound decisions at appropriate times.

DEFINITION OF TERMS

In this and succeeding chapters three terms are used: need, program for meeting the needs, and project. "Need" as generally used is a rather broad concept referring to the number of pupils to be accommodated, the kind of facilities to be provided for them, and the facilities required to correct certain substandard conditions. As used here it refers only to the kind of facilities; it means the characteristics of the physical setting required to achieve a given purpose. This involves not only a definition of the purpose to be achieved but also a concept of the process or means through which the purpose is to be attained. Since the purposes of schools

change over a period of time and since the ways of attaining a purpose are constantly changing, the objective is to define needs in flexible and adaptable terms—to find concepts of facilities which will serve a variety of purposes and which will lend themselves to a variety of means for achieving a particular objective. Needs which involve characteristics that remain substantially the same regardless of purpose or activities carried on are classified as "permanent needs." Needs which involve characteristics that can be modified to fit changed purposes or practices or which should be kept flexible for either reason are classified as "temporary needs." This concept of need will be developed and illustrated in later sections of this chapter.

"Program" and "project" as used here are closely related terms. A project is defined as (1) a site acquisition, expansion, or improvement, (2) an improvement in, alteration of, addition to, or other change in an existing structure, or (3) a new structure to replace an existing facility or to add capacity to available facilities. A program is a plan for meeting all of the needs for school facilities in a school system through one or more projects. The characteristics of sound long-range-program planning are summarized briefly in this chapter and developed more fully in Chapter 3 and Part Two.

LEADERSHIP IN DECISION MAKING

The most far-reaching decisions on the need for school facilities demand complete factual background, but even more they require perspective and imagination. The leader can acquire the obtainable facts and can make them available to those responsible for making the decisions.

The superintendent's leadership may be exercised on at least three different levels. The first level is that which is limited to administrative matters covered in Part Three. These practical aspects appeal to the man of action responsible for getting things done. Sometimes he is impatient with study, deliberation, and planning. The need for the facility in the immediate future may be evident, but questions are not raised as to whether the project is the one most needed at the time, whether the project will fit into a well-conceived long-range program for the community, or whether proceeding with the project will add or subtract from the over-all quality of educational results. Such a leader often finds it hard to spend the time required to get the facts. Those who view leadership responsibilities from this narrow perspective may have little patience with this chapter or perhaps with Parts One and Two of this book.

The next level of leadership is that of initiating the factual studies and planning required for the formulation of a long-range school-building

program, determining the sequence of projects in the program, carefully selecting sites for the program, and preparing the best possible educational specifications for each project (Part Two). Heavy reliance will be placed upon the findings of the studies and the recommendations of consultants and other specialists in recommending courses of action. The leader on this level will attempt to see beyond administrative action and will exert leadership in decision making, at least in so far as such perspective will permit.

The third level of leadership is that of seeing total educational operations and weighing all proposals or courses of actions affecting school plant in terms of immediate and ultimate effects upon the quality of operations. The leader at this level will not assume that school facilities per se will add to the quality of instruction. He will not hastily conclude that a contemporary concept of goodness in school buildings represents a long-range need which has to be provided. He is capable of questioning and evaluating the assumptions, findings, standards, and proposals of specialists. He is capable of discriminating among the varying concepts of school-building needs possessed by various types of persons. His superior insight and vision make him a real leader in decision making. It is to this type of leader that Chapter 1 is primarily directed. Only this perspective will make school facilities serve their true function, the improvement of learning.

In order to exercise enlightened leadership the school administrator must be able to subordinate technical problems and administrative detail to the fundamental problems. He also must be able to visualize the basic problems and decisions in sequential order—which ones have the most profound effect upon subsequent decisions or actions.

MAJOR DECISIONS IN PROVIDING FACILITIES

The scope of decisions in the administration of a school-building program may be considerably clarified by thinking of them in a flow chart from recognition or grasp of *need* to development of an acceptable *program* for meeting the needs followed by advancement of specific *projects* in that program.

This idea will be the theme throughout Part One. The danger of rushing into program formulation under pressures of the moment without having logically provided for clarification of fundamental need is so great that the first two chapters are devoted to the establishment of need. They propose a conceptual basis for sound decision making when the long-range program is later discussed (Chapters 3 and 4).

The major decisions involved in the administration of a building program may be grouped broadly into five categories. These are arranged

chronologically indicating which have the most profound effect upon subsequent decisions. They are:

1. The provisions that have been made by the school authorities for the early identification of emerging needs

2. The concept of what constitutes a need calling for community deliberation and action

3. The general agreement secured within the community as to what constitutes its needs for school facilities

4. The planned program for meeting the agreed-upon needs

5. The specific site and construction projects to be undertaken at a given time to accomplish the program

In each of these five categories numerous crucial decisions occur. It is apparent that within the first three categories an orderly and responsible approach to the definition of community need for educational facilities is sought. The sections which follow refer to items 1 and 2.

The following check list summarizes the most critical questions which must be answered under items 1 and 2. The questions arising under items 3 to 5 will be summarized in the remaining chapters of Part One.

CHECK LIST OF MAJOR PROBLEMS

Provisions for identifying needs

1. Has provision been made for identifying emerging needs for school facilities long before they become so acute or pressing as to demand immediate action?

2. What further provisions for early identification of needs should be made in the particular school system at any given time?

Analyzing, classifying, and weighing needs

1. What factors determine or condition the needs for school facilities which can be identified?

2. How can it be determined whether the needs that have been identified represent a proper balance of the various factors?

3. How can the various needs be classified or ranked according to their relative value or importance—essential versus desirable?

4. What kinds of needs might best be met by periodic adaptations of a structure?

5. What types of structures have proved to be most flexible or adaptable for this purpose?

6. What kinds of needs require new construction or major reconstruction of existing facilities?

7. What future changes, adaptations, uses, or contingencies should be considered in thinking about new structures or major reconstruction of a facility?

8. What factors other than school-facility needs should be weighed in order to contribute most to the quality of the schools?

PROVISION FOR IDENTIFYING NEEDS

Unless provision has been made for discovering needs before they become acute, there will be no opportunity to examine the soundness of the basis for the need, to weigh the need relative to other needs, to find the best long-range solution for the need, to incorporate the need into a carefully planned program, and to undertake the necessary projects at the proper time. As a result of failure to provide for the early identification of needs, there occur hasty initiation and planning of particular projects, frequent difficulty in obtaining satisfactory sites at a reasonable cost, advancement of projects without a full understanding of their proper place in the long-range program, and possible waste of community resources.

Decisions on the need for school plant should be made well in advance of time that a need becomes pressing. This principle involves such basic questions as these: Has the school system made provision for continuously studying future needs for school facilities? Has it provided for obtaining data on all other factors affecting the quality of its schools? Has it made provision for full use of the data in determining needs? Has it involved all affected parties—the staff, the community, other local governmental agencies—in order that satisfactory agreements can be reached relative to needs before they become pressing? These are the first questions the school superintendent must ask himself.

If the school board has not made provision for the continuous study of potential needs for facilities, the superintendent as chief administrative officer should take the lead in getting a policy adopted on the matter. The size of the school system will determine to a large extent what provisions he can or should recommend. In a larger system there may be a full-time staff assigned to such studies as are outlined in Part Two. In a small school system the school administrator may propose a survey to be done by outside consultants and kept up to date by his staff. At the very least, every school administrator can use his own office and available staff to gather as much data as possible for anticipating needs in advance.

FACTORS DETERMINING NEEDS

The need for school facilities is based upon a composite of a great many cultural elements including such diverse matters as these:

1. The purposes of the schools
2. The theory and practice developed to accomplish each purpose
3. The nature of the school as an institution, including (*a*) community

services performed by the schools and (*b*) cultural, educational, and recreational programs of other community institutions

4. Esthetics
5. Considerations of health and safety
6. Construction materials and methods

The fact that a school system may begin with a set of school-building standards as a basis for establishing its needs does not change the true basis of need. Each of the foregoing elements is implied in all such standards. No school administrator can assume that any set of standards incorporates all of the right decisions on these matters for all communities at all times.

School-building standards developed by specialists, if properly applied, are a useful guide in identifying possible needs for space (see Chapter 6). Unfortunately they may be used indiscriminately and sometimes are applied too rigorously. It is not always recognized sufficiently that such standards reflect the sense of values, the concept of educational purposes, the hierarchy of purposes, and the compromises among the demands of the various purposes of the persons who formulated them.

Such standards are not like the standards used in scientific measurement. They represent no absolute values which all should accept. They should not dictate the purposes of a school, the objectives to be emphasized, or the compromises to be made. They are useful in conceiving facilities which may be required for future changes in operational objectives. They should be weighted against the demands of local school objectives and of the other important factors affecting the quality of education.

The assumptions which underly the piecemeal replacement of facilities, the hasty provision of facilities for increased enrollments, or the sporadic modernization or rehabilitation of available plant really represent some of the most crucial decisions affecting the future effectiveness of the schools. The fact that a school building fails to meet certain accepted standards by itself does not mean that the building should be replaced. Other solutions may prove better in terms of the future needs of the community. Increased enrollment in excess of capacity of available plant by itself does not demonstrate a need for new construction. The increase may be temporary and call for a temporary solution. Modernization or rehabilitation may not always be the best solution for a particular school-building problem. The cost may be too high in terms of long-range needs. Such assumptions have to be tested in terms of a series of questions. Assumptions which are not thoroughly analyzed can lead to mistakes which cannot be corrected for decades.

Guiding Principles. None of the above six elements which provide the basis for school-facility needs are objective or unchanging in nature.

This has serious implications for the most basic decisions that have to be made in determining the need for school facilities. Three guiding principles for making decisions are stated below. Each is followed by a list of some pertinent questions to be answered.

1. *Decisions on the need for school facilities should be made upon the basis of a thorough understanding of the community sanctions for school purposes and the stress to be placed upon various objectives, the probability of change in these, the unpredictable nature of the change, and the lack of final knowledge as to what kind of space is absolutely essential for the attainment of any given objective.*

Pertinent questions to be asked are these: What values and purposes are reflected in any statement of needs? How stable are these likely to be in the particular community? What objectives demand the greatest amounts of space or the spaces which cost the most? To what extent can these demands be met without sacrificing spaces which might be required to fulfill other purposes in the event of a change in the prevailing values?

2. *Decisions on the need for school facilities should be made with due consideration to differences in theory and practice and institutional patterns, trends in these matters, and the probability of future changes.*

Some critical questions are: What kinds of space have proved to be most adaptable to such differences or changes? What kinds of space have proved to be too inflexible for such adaptations? What new developments in construction enhance space flexibility? Do the needs presume the continuance of practices or institutional characteristics which have changed in the past and are likely to change in the future?

3. *Decisions on the need for school facilities should be examined critically to determine the degree to which they have been conditioned by esthetic taste or style, considerations of health and safety, and particular construction materials and methods.*

Among the questions to be asked are: Would other equally acceptable matters of taste reduce the assumed need? Are there other acceptable ways of providing for health and safety which would not involve as much space or equipment? Have all possible developments in construction materials and methods been thoroughly considered?

Purpose and Need. It is impossible to conceive the needs for school facilities except in terms of what is required to achieve particular educational and cultural purposes. The purposes and the relative priorities or stress placed upon each represent value judgments. If the need for space is determined by any one of the following groups—the school administration, the staff, the architect, outside consultants, specialists, the standards enforced by a state agency, the school board, or citizens' advisory groups—the definitions of space needs will reflect the values

and purposes of the particular group making the decision. Unless such purposes and values generally are accepted by the community, they are not likely to prevail for long. In the long run the objectives of the schools will conform to community values.

Community values and the resulting stress upon various school objectives are not fixed factors. The values will change and can be changed by new means of communication, population shifts, new problems, new insights, leadership, and many other factors. Moreover, few communities are so homogeneous as not to have conflicts in values and differences of opinion as to what schools should do. What may be called the dominant values at any particular time will shift with changes in the strength and aggressiveness of the various groups. This means that the accepted purposes and priorities in a community are not a stable factor in planning school buildings, and it is not always possible to predict the direction of future changes.

It is easy to accept the values and purposes presumed in the existing school program as a basis for school-building needs. Yet needs defined upon such a basis ignore the probability of change. The program housed in the plant even fifteen years after construction may be very different from the one presumed when the structure was planned. In fact, the program on the date of occupancy may not be the same as that assumed in planning. This is so because of changing national and community conditions, changes in pupil population and problems, growth in knowledge and technology, and other conditions.

The prevailing values in a community, the accepted priorities in school purposes, and the pressures being exerted at any given time do not provide a sound basis of need. It is the task of the school administrator to know the relative overemphasis or underemphasis of educational objectives in his community and to exert his leadership to secure general agreement on the long-range needs of the community (see Chapter 2). Some examples of this problem are given below.

A community reasoning on the basis that all other objectives depend upon the preservation and nourishment of life will normally place a high value upon the objectives of health and safety. It will place a high priority upon having a space for learning which will itself promote these objectives. It is not satisfied with merely correcting conditions that seriously impair the health and safety of pupils. Such a locality will be concerned with space for outdoor and indoor sports and recreation, for sanitary facilities, heat, light, ventilation, health suites, rest space, for cafeterias, facilities for corrective physical education, and other environmental factors contributing to health. These are among the most extensive and expensive facilities.

Provision for the objectives of health, recreation, and safety is taking an ever-increasing proportion of the space in modern American school buildings. This may reflect present-day public values and emphasis, and it also may be influenced by the aggressiveness of the practitioners, the promotion efforts of vendors, and the strong appeal of physical activities for youth and alumni. These objectives make great demands both upon out-of-doors space and indoor space, and it is important to inquire how essential both types of space are for achieving the purposes. What is the relationship of the health and recreation of a community to its past provisions for space to promote these objectives? If space provisions appear to have a real bearing upon health, is it out-of-door or indoor space which makes the contribution? If the answer is affirmative on one or the other or both, is it essential for the schools to provide the space? These questions to date have not had a definitive answer. The decisions reflect a faith, aspiration, or hope which some communities have been very ready to accept.

It is also imperative that due consideration be given to such questions as whether these space demands are detracting from or contributing to the attainment of other worthy objectives; whether the resulting buildings are adapted to a change in emphasis; and whether there are promising alternate solutions which might be tried. A nation that can afford much more than the bare essentials in its daily life not only can afford the marginal utility features of school buildings but also can afford spaces for a wide variety of educational purposes. The difficulty is that the features provided in some school plants may not be balanced in terms of the daily objectives. Space vitally required for important purposes may be sacrificed to provide abundant space for other purposes or for purposes which might more satisfactorily be conducted by some other agency of government.

A great deal of space in a school facility may be seldom or never used to promote the accepted educational objectives. The indoor areas for health and physical education often include a large area for audiences. The large auditorium with its lobby, ticket offices, stage, seating space, and storage space may be the largest single plant facility of a school. The auditorium and gymnasium combined may represent half or more of the space in a school-plant facility. The out-of-doors features may include large areas for parking cars, arrangements for seating large crowds, and other developments seldom, if ever, used for the more traditional school purposes. The very magnitude of certain of these spaces suggests a searching inquiry into their educational contributions as compared with the facilities most frequently used by pupils. To provide space which yields the greatest potential for school quality

may call for leaving some features of school buildings in the preliminary drawing stage—to be added after certain major improvements have been made.

Material aspects of school facilities may have little appeal to people who reason that moral and spiritual values are to be placed above all else or to people who want to stress above all else mastery of essential knowledge and basic skills. Spaces planned with either utilitarian or academic bias may be expensive to modify later in terms of broader objectives. The same is true to varying degrees in communities with a strong emphasis upon any one objective, such as vocational education.

Those who make the decisions on the need for school facilities must recognize the particular pressures upon particular objectives in their locality. Unless they can so view the enterprise, it is impossible to detect the failure to identify space requirements for certain purposes or the tendency to want elaborate facilities for others. It may not be possible to change the dominant values of the community before defining the needs for space, but it at least is possible to anticipate other needs and to avoid decisions which would make it impossible or difficult to provide facilities for changed objectives or a varying importance assigned in the future to any of them.

Theory and Practice. Every operational objective leads to its own theory or theories relative to the best means for attaining it. Every theory develops its own body of practice. It is these elements which are referred to loosely as "the educational program." Every practice has its own demands relative to the amount and kind of school facilities required. To those responsible for operations at any given time, space required for a particular program may appear to be paramount. The practitioners recognize what is needed day by day. They are not apt to look to the future when thinking of space requirements for education.

Historically there has been nothing fixed about educational theory or practice. No one possibly can anticipate at any given time what in currently accepted practice is going to be replaced by a better theory or practice in the future. Most of the means for promoting educational purposes—personnel, organization, programs, methods, activities, and instructional aids—can vary from day to day or from year to year. They are being modified constantly in terms of new insights, research, experimentation, experience, changes in personnel, and other factors. In comparison the physical facilities at best are much less flexible. Yet constructing schools to fit what someone thinks theory or practice will be in the future may not make the physical structure any more adaptable to the changes which actually will take place.

The ingenuity of school-building specialists may have been too exclusively devoted toward finding ways to adapt space to particular school

programs. The age of pupils, the things pupils are expected to do as revealed by current or anticipated theory and practice, present insight into the learning process, and other specific concepts are built into the school-plant structures. If ingenuity had been devoted toward developing flexible partitions, movable fixtures, and adaptable features making possible easy alteration of the size, shape, and other characteristics of a given space, school buildings might not have blocked school improvement to so great an extent.

If a person thinks that today he is better able to anticipate the changes which will take place in the future than were our predecessors, he is probably due for disappointment. Many of the structures built today will be just about as restrictive as were those in the past, the only difference being in what concepts are built into the structure. A promising solution lies in not building in so many features unless it is more efficient to do so. The goal should be to make it possible to bring in what is needed at any given time, and to take away as the program changes, or to substitute something else.

A great deal of the rigidity of school facilities flows from fixed standards established for the various parts of a school building—size, shape, and built-in features. Such standards at any particular time reflect personal opinion as to what is best and likely to be most lasting in existing theory or practice. Whether or not this opinion will be supported by subsequent experience, research, experimentation, and developments is always unknown. This consideration should introduce a note of caution into blind acceptance of all such standards. They should be examined most critically.

A factor making for rigidity in school facilities is the growing difference in the kinds of spaces provided in elementary, junior high, senior high, and vocational school buildings. The spaces provided in these structures presume a permanence in grade organization, curricula, and related matters which simply does not exist. The grouping of grades always has undergone periodic changes. What is taught at particular grade levels is constantly changing. The distribution of pupils by grades in any particular area varies considerably over a period of time. One of the errors to be avoided in defining needs for space is the concept of highly specialized spaces or buildings suited to only one purpose. Rooms that can readily and inexpensively be converted to alternate uses by pupils of varying ages are to be preferred. Buildings which can readily be shifted to use by different grade organizations or schools are more likely to contribute most to education in the future.

The key to intelligent identification and definition of school-building needs is ability to imagine alternate uses for space and to define space so that it will serve the maximum number of alternate purposes.

Community Factors. The public schools in some communities and neighborhoods perform governmental or social functions which elsewhere are assumed by other governmental agencies or by other institutions. Sometimes the performance of these functions adds very little to the need for school facilities. All that is involved is better utilization of facilities required for school purposes and perhaps a small increase in the cost for operation and maintenance.

Sometimes these community uses of school facilities greatly increase the needs in terms of the size of auditoriums, foyers, kitchens, dining areas, recreational facilities, gymnasium seating for spectators, stadiums, toilet and cloakroom provision, and other items. If a school system has ample resources to provide a high-quality school program, including funds for employment of competent professional personnel and satisfactory facilities for its functions, there may be valid reasons for adding these special facilities to meet its needs. However, most school systems in terms of the quality of their offerings, the inadequacies of their existing educational facilities, and their limited resources or fiscal powers should weigh the need for such extra facilities most carefully. Will these provisions handicap or impede needed improvements in the educational process itself? Are they essential for the life of the community?

Some school systems have been too ready to extend their functions at the expense of school quality. Others have not hesitated to duplicate facilities already being provided by other community institutions. Indeed the latter may be a more wasteful or harmful course than the former. Attention should be given to the sharing of costs with other institutions or government agencies where the school is expected to provide facilities for community use beyond what is required for the educational function itself. As emphasized throughout Part Two, community studies and planning are required to avoid duplication of community facilities for health, education, culture, and recreation.

Other Factors. It is not possible to conceive facilities for learning apart from current esthetic and materialistic preferences. Indeed it is difficult for those who make decisions on space requirements to realize how profoundly these preferences affect their decisions. Many of the spaces included in school facilities, such as shops, gymnasiums, playrooms, storage space, bus garages, and homemaking suites, involve construction materials of a quality not demanded by the functions to be served by the space. They are designed to conform to traditional architectural styles. As a consequence of esthetic bias, the possibilities of landscaping, campus arrangements, and dispersal of certain facilities are too seldom explored.

Practically every exterior or interior feature of a school building is liable to excessive cost in an attempt to satisfy rigid esthetic preferences.

In fact, such monumental aims may make demands upon the resources of a community which preclude the providing of spaces essential for effectively carrying on the work of the schools. Yet such considerations by themselves make little direct contribution to education and they change with times. The public taste usually changes before the facility has been depreciated.

At a time when technology is producing so many mechanical devices for promoting comfort and convenience, it is not surprising that such technical developments are making increasing demands upon resources available for providing school plant. Before a school system decides to purchase expensive mechanical systems for controlling heat, humidity, ventilation, and sound, for communication, for parking cars, and the hundreds of other appealing conveniences which can be incorporated into a modern building, it should make certain there was no sacrifice of essential educational facilities in order to provide these features.

GUIDES FOR WEIGHING NEEDS

Decisions often are made relative to school-plant needs without examining how carrying out these decisions would affect the immediate and ultimate quality of the schools. Such an analysis is most essential when long-term debt is incurred to finance the needs.

The need for physical facilities cannot be defined independently of all other requirements for achieving the educational results desired. A school system which has a satisfactory policy for personnel, which is attracting and holding the most competent practitioners, which is supplying them with the satisfactory materials and tools required for effective daily work, and which has ample resources to do more can enhance the effectiveness of its program by plant investment, provided that such action does not detract from these assets. To the extent that such an investment removes obstacles to the effectiveness of capable practitioners and to the extent that it enhances their morale and enthusiasm and that of the pupils, the physical plant contributes to school quality.

The too often uncritically accepted idea that material surroundings per se will contribute to the quality of results has led to more unwise decisions than generally has been recognized. Some school buildings give a false impression of the quality of what is going on in them. Those responsible for schools easily can see how the appearance of their buildings compares with others. They seldom are aware of differences in the effectiveness of their school programs. Yet material surroundings by themselves probably contribute little to learning. It is futile to expect the quality of a structure to reflect itself automatically in the quality of those who use it.

Factors Affecting "School Quality." There are a number of factors which determine the quality of an educational program: the caliber of the professional leadership and administration, the competence of the staff, the adequacy of staffing, the quality and quantity of various materials and aids to learning, and the physical plant. Capable and creative staffs can overcome plant limitations that would impede seriously the limited effectiveness of mediocre persons. On the other hand, a school system with mediocre personnel cannot hope to improve the quality of education very much by merely improving its facilities. School-plant facilities contribute most to education when used by competent teachers. There is also a danger to be avoided in providing spaces so rigidly and extravagantly planned and constructed that they would impede the efforts of even an able teacher.

Unless it applies standards to the quality of its staff, to the adequacy of its staff, and to the adequacy of its tools for learning that are just as demanding as those which it applies to physical space, a school system is likely to provide a material setting which gives a false impression of its real effectiveness in achieving its purposes. Unless the need for school facilities is defined from this broad perspective, a community may find itself with an improved school plant but with a net loss in school quality or no net gain in quality or a net gain not equal to the added investment. Since decisions on space are so profoundly related to decisions on other important elements in the educational process, considerable attention will be given to these decisions in Chapters 2 and 3 following.

Interdependence of Need. The need for school facilities in a community is not an absolute concept. It is possible to list all of the things which would be desirable to have by way of school facilities in any community, and indeed this is a good step to take. It provides a good starting point in weighing what is necessary in a particular locality. Facilities which would be considered essential in one community, however, would be most indefensible in another in relationship to the total needs. Sound judgment as to the need for school buildings must include a resolution of all the relative values concerned (Figure 1-1).

The process of determining school-building requirements is one of weighing the many factors which indicate whether a given facility is needed relative to what has to be done to make the schools effective. Among the major factors to be weighed are these:

1. Quality and adequacy of staffing including administrative staff
2. Financial reserves for current budget relative to capital budget
3. Program adequacy by age levels, geographic areas, and other groupings
4. Kind of facilities available for the same groups

5. Need for reorganizing the local school unit or its component attendance areas

6. Trends and developments affecting the community as a whole and its component attendance areas

Fig. 1-1. The school administrator must consider the total scope of his program.

CRITICAL ADMINISTRATIVE DECISIONS
IN PROVIDING SCHOOL FACILITIES

Basis of need	Permanence of needs	Priority of needs
1. Provision for early identification of an emerging school-facility need 2. Preliminary definition of an apparent need 3. Evaluation of the basis of such need 4. Identification of factors affecting the need 5. Acceptance or rejection of the need-validity	1. Analysis of possible future changes in various school-facility needs 2. Study of possible effects of trends upon the needs 3. Determination of ways of fulfilling need involving maximum adaptability and flexibility 4. Redefinition of needs, permanent vs. temporary	1. Provision for identifying and defining total needs, affecting school quality now and in future 2. Basis for judging what will contribute most to quality at a given time 3. Analysis of effect of providing for a given school-facility need upon other needs 4. Restatement of school-facility needs in terms of total needs
Community acceptance	**Program formulation**	**Project advancement**
1. Assessment of probable community acceptance of needs by major segments concerned 2. Provision for securing community agreement on needs 3. Provision of resources for community study of needs 4. Provision for properly using and leading participants 5. Statement of agreed-upon needs	1. Provision for long-range planning to meet the needs agreed upon 2. Evaluation of available school and community facilities 3. Study of possible uses and increased utilization of available facilities 4. Provision for enrollment forecasting, and use of forecasts in planning 5. Review of program in terms of balance by objectives, programs, age groups, geographic areas, etc. 6. Basis for priorities for projects in program	1. Basis for site selection 2. Provision for preparing educational specifications 3. Plans for legal services, finance, public relations, architectural and other services 4. Acceptance of preliminary plans, final plans, and specifications 5. Selection of contractors and provision for supervision 6. Plans for use 7. Final acceptance

7. Relative emphasis placed upon certain values and purposes in relation to what is needed
8. Community facilities available for school use

These and other important considerations in determining relative need for school facilities will be discussed in the chapters which follow.

Considering Possible Solutions. It is very easy to translate every need identified for school facilities into new construction. Every alternative for providing the kinds of space needed—cooperative arrangements with other agencies, conversion of available spaces, remodeling and rehabilitating available spaces, renting, modernization, and others—should be explored before a decision is made to add to the physical plant or to replace and abandon parts of it.

The need for new construction is relative to the ingenuity and skill exercised in making the most effective use of spaces already available. This requires a careful evaluation of such spaces in relation to all possible uses which could be made of them. Evaluating them solely in terms of the use for which they originally were planned may conceal their assets for other purposes. Studies of utilization and various means for increasing utilization often can reduce the need for new or additional space, as shown in Chapter 8.

Where a school system approaches its school-building problems piecemeal and makes decisions on individual sites and projects without regard to its other needs, both current and capital, the possibilities of waste, unbalanced development, neglect of high-priority needs, and other mistakes are multiplied. Furthermore, such an approach assumes that the needs of the school system are unrelated to the community of which it is a part. The result may be a duplication of community facilities, or the provision of facilities whose usefulness may be impaired by other community developments, or competition for funds and unwarranted burdens placed upon taxpayers as a result of ill-considered timing of construction or financing of a project.

The decision to acquire a particular site or to undertake a given project should be made in terms of a long-range school-building program encompassing all of the essential needs of the school system in relationship to other long-range plans of the community. This principle is developed in Chapters 3 and 4.

Project Choices. Once the decision has been made to advance a particular project in the long-range program, there is a sequence of decisions to be made. The first involves the scope of the project—its general character in terms of function, spaces (both present and probable future), and location. This fixes the site requirements. If the site has been acquired in advance, its suitableness to the proposed scope of the project has to be determined. If the site is not suitable, then the question becomes one of adding to it, acquiring a new site, or altering the scope of the project.

If a new site is to be acquired, there are many key decisions which vitally affect the future usefulness of the facility, the cost of construction, the cost of transportation, the cost of site development, and other aspects of the current and capital program.

Before and during the time that the project is in the preliminary planning or drawing stage, the decisions on the particular spaces included within the scope of the project may be altered at will. Indeed the more alternatives and future contingencies that can be imagined, the greater the possibility of obtaining space which will be functional for a variety of uses in the future.

Decisions on sites and the character of the spaces to be incorporated into a structure should be made before the architect is asked to prepare plans and specifications for construction. A structure has to be planned for a particular site. Altering the decisions on the spaces needed or on the arrangement of spaces after plans and specifications are prepared is like tearing down a structure after it is built. The many key decisions required from the time a project enters the planning stage until the completed structure is accepted and occupied will be outlined in Chapter 4. The administrative problems involved are discussed in Part Three.

SUMMARY

In order that the need for school plant may be properly estimated and a program designed to satisfy long-range values, the school administrator is advised to initiate studies well in advance of the time when the need becomes pressing.

The cultural elements that form the basis for a concept of need are diverse, including such factors as educational purposes, instructional practices, institutional program, community wants, and practical means. So-called standards are only a convenient way of formulating these elements for immediate application.

Any evaluation of community purposes in education must be made in view of the probability of change in such purposes or at least an unpredictable shift in emphasis. The theory and practice that comprise the educational program have in the past and probably will in the future undergo changes.

Communities differ in their basic concepts of purpose. Some are currently emphasizing facilities for recreation and healtb, and for community use of the plant; others feature vocational education or stress more strictly academic pursuits. These are substantial cost factors when translated into school plant. Doubtless the nation can well afford to provide facilities for a wide variety of educational objectives.

One way to anticipate future requirements, particularly with reference to educational practice, is through the *principle of flexibility*. Spaces designed with alternative uses in mind would probably have longer-term usefulness.

Highly specialized modern equipment has its place in the various departments of a school system, as also does the esthetic integration of the total plant design, but the expense of both should be weighed against the functional requirements

of the educational facilities to be constructed. While a properly designed school plant contributes substantially to the effectiveness of teaching, it can under some circumstances be a drain on the financial resourees available for the total program. Standards must be upheld for the total program if the plant investment is to have meaning. Competent staffing is indispensible.

The need for school plant is a relative concept. The goal of policy decision is to arrive at an effective solution for both the present and long-range needs.

DISCUSSION PROBLEMS

1. Give a complete definition of the school plant.

2. Prepare case studies of several consolidated rural schools built ten or more years ago. Which facilities contributed most to the improvement of their educational programs? What facilities are either not used today or only partly used? Where could more flexibility have been introduced in the design to produce more effective utilization?

3. Debate the question as to whether the state or the school district should be the responsible owner of the public school plant.

4. Illustrate the advantages and disadvantages of standards for school construction enforced at the state level.

5. Demonstrate the importance of recognizing hidden or background factors in a school-building program and of considering all facts and factors in achieving balanced judgment.

6. Formulate a suitable resolution by which the school board may delegate broad responsibility to the superintendent of schools and authorize him to make maximum use of the professional competencies of the school staff.

7. Since the school board is responsible for the total long-range educational program, what relationship between capital expenditures and operating expenditures should be established in the school-district budget?

8. A community school is not a new development in America, as early pioneers often used the school buildings for social, cultural, and recreational purposes. Should the planning of schools be oriented primarily toward a neighborhood school unit emphasizing the educational curriculum or a comprehensive school plan based upon community education or upon a community way of life?

9. Evaluate the school information that will be of both interest and help to the electors in making up their minds where they stand on a school-building program. Which elements in the community will be most concerned with such information? What is the risk of pressure from special-interest groups in the community?

10. What conditions contribute generally to a high degree of public esteem for the school-district plant?

11. Under what circumstances will a school district pioneer and produce superior school-plant plans?

12. Show how the adaptability of the school-building plan to educational purposes and practical considerations depends upon the identification of problems and production of satisfactory solutions.

RELATED READINGS

American Association of School Administrators: *American School Buildings*, Twenty-seventh Yearbook, Washington, 1949.

Betzner, Jean: *Schoolhousing Needs of Young Children*, Association for Childhood Education, Washington, 1939.

Butterworth, Julian C.: *Rural School Administration*, The Macmillan Company, New York, 1926.

Caudill, William W.: *Space for Teaching*, Bulletin 59, vol. 12, no. 9, Engineering Experiment Station, A & M College of Texas, College Station, Tex., 1941.

———: *Toward Better School Design*, F. W. Dodge Corporation, New York, 1954.

Educational Policies Commission: *The Purposes of Education in American Democracy*, National Education Association, Washington, 1938.

———: *Education for All American Youth*, National Education Association, Washington, 1944.

Engelhardt, N. L., and Fred Engelhardt: *Planning School Building Programs*, Bureau of Publications, Teachers College, Columbia University, New York, 1930.

——— and N. L. Engelhardt, Jr.: *Planning the Community School*, American Book Company, New York, 1940.

Fowlkes, John Guy, et al.: *Planning Schools for Tomorrow: The Issues Involved*, U.S. Office of Education, Federal Security Agency Leaflet no. 64, Washington, 1942.

Herrick, John H., Ralph D. McCleary, Wilfred F. Clapp, and Walter F. Bogner: *From School Program to School Plant*, Henry Holt and Company, Inc., New York, 1956.

Hopkins, L. Thomas: *Interaction, the Democratic Process*, D. C. Heath and Company, Boston, 1941.

MacConnell, James D.: *Planning for School Buildings*, Prentice-Hall, Inc., Englewood Cliffs, N.J., 1957.

Moehlman, Arthur B.: *Public School Plant Program*, Rand, McNally Company, Chicago, 1929.

Mort, Paul R., and Donald H. Ross: *Principles of School Administration*, McGraw-Hill Book Company, Inc., New York, 1957.

National Council on Schoolhouse Construction: *Guide for Planning School Plants*, rev. ed., Peabody College, Nashville, Tenn.

Perkins, Lawrence B., and Walter D. Cocking: *Schools*, Reinhold Publishing Corporation, New York, 1949.

Ross, Donald H., and Bernard McKenna: *Class Size: The Multi-million Dollar Question*, Metropolitan School Study Council, Columbia University, New York, 1955.

Sears, Jesse B.: *The School Survey*, Houghton Mifflin Company, Boston, 1925.

Viles, N. E.: *Local School Construction Programs*, U.S. Office of Education Bulletin no. 20, Washington, 1957.

CHAPTER 2

Agreement on Needs—The Participatory Approach

The chief executive may realize the importance of defining needs for school plant from the broad perspective presented in the preceding chapter. He may go so far as to make his own decisions on the broadest possible basis; but the decisions which will prevail are the ones that can be substantially agreed upon by all parties concerned. These always include the school board, the staff, and the citizens of the community. Whenever they are involved, the recommendations of architects, specialists, and school-building consultants have to be weighed in the process of decision making. In some instances a state agency or some other local governmental unit may be a party to any decisions made.

Decisions on school facilities once carried into effect are not easy to change without considerable delay and waste. There is no better way of anticipating the possible effects of various decisions than to test each of them before groups with conflicting values and viewpoints. The very process of harmonizing different viewpoints and seeking working agreements can contribute to better decisions and wider public understanding of the basis of decisions and their wisdom.

THE SUPERINTENDENT'S ROLE

It is possible for the school administrator, with or without the assistance of school-building specialists, to formulate a statement of needs and then to interpret and sell it to other groups. This procedure is the easiest to follow. If the administrator is right in his decisions and if he convinces others of their wisdom, the result may be just as good as any other procedure would have produced.

The administrator, however, is not likely to be right in his decisions unless he involves all affected parties. *The competent and skillful superintendent will recognize the potential contributions each group can make to the decisions on needs.* He will be aware of the limitations of the perspective of each. He is able to capitalize upon the contributions of various participants and to minimize the limitations of their viewpoints. In the process of defining the needs for facilities he will have attained the necessary agreements and harmony of conflicting interests. The task of interpretation and convincing will have been accomplished.

This procedure is not easy to administer. Decisions on needs have to be secured well in advance of the succeeding steps in meeting the needs if costly delays and changes are to be avoided. The procedure itself is time-consuming and must be initiated well in advance of formulating a capital program. Furthermore, the process of reaching agreements usually involves compromises. The challenge is to reach agreements which will contribute to the quality of the schools rather than agreements per se.

By virtue of his qualifications and position, the school administrator should be the community leader in educational affairs. He is expected to look ahead and visualize the procedural steps in providing school buildings. His duty is to advise the school board on policy and to execute the policies adopted by the school board. In doing so he must be both a coordinator of studies and a source of encouragement to his coworkers. He must know his own resources and those of his staff, and how to obtain and use other resources.

Let us assume that a local school administrator, the superintendent of schools of an average school system, realizes that he will soon have enrollments increasing beyond what his present school plant can accommodate. The problem is to have his school board and community take well-considered action to provide the necessary facilities. He is faced with several areas of uncertainty—the future school program to be housed, the location of school sites, the amount of construction, the best administrative organization and plant layout, the conservation of existing facilities, the budget and finance, the soundest business procedures, where to seek advice, how to use his staff in planning and executing a program.

At this initial stage of his work he decides upon a strategic course of action. Exactly what course he will choose depends upon many local factors—the type of community, whether rural or urban, wealthy or heavily indebted, accustomed to constructive group action or unaccustomed; the current state of alertness among the staff, school board, and community as to educational values; and the existing relations to other agencies of government that exercise controls. The general course of action that he adopts can be initiated at once and the systematic fact-

finding procedures set in operation, since no change of policy is involved thus far. Up to this point he is exercising his leadership responsibilities.

These guides contribute to successful leadership of this kind:

1. Know the community, know it thoroughly, and the school and its personnel as well, and recognize problems where they exist.

2. Have preliminary studies made to get a better perspective of the problems.

3. Secure the backing of the school board as soon as possible; you can't legally or morally proceed far without it.

4. Seek advice on your plan for organizing the studies and conducting them.

5. Adopt a schedule of tasks to be done and keep a control record of progress.

6. Make careful pre-preparation for any and all group meetings; avoid being taken by surprise.

7. Give attention to all matters of procedure; get the facts on record first.

8. Present the problems before the possible solutions.

9. Organize a good plan of public presentation, recognizing the interests and psychology of people; and use effective techniques for explaining data.

10. Be sure there is complete understanding of the function and scope of different agencies, the school board, the school staff, the architect and similar specialists, and the lay advisory bodies.

11. Delegate the specific planning jobs.

12. Make an objective analysis of the possible public decisions.

13. Generously share the credit for wise decisions.

14. Forestall unwise decisions by providing time for deliberation.

Opinion is formed through leadership. The social structure of a community has many leaders in many areas, and a good public relations program will make sure the individuals who are leaders are themselves fully informed about the school-building needs. It would be very biased to suppose that the method of working through leaders is a self-sufficient basis for gaining general public understanding of school needs; yet as an avenue of public relations it helps substantially to attain full community support of any civic undertaking.

FUNCTIONS OF THE BOARD OF EDUCATION

The structure in local school government is based upon certain almost axiomatic principles. The local unit is legally a subdivision of the state, created for the express purpose of establishing, operating, and maintaining efficient public education; and as such its enabling powers, both

specified and implied, are granted by the constitution and statutes of the state. The school board, as an agency of the state, is designed to represent the interests of both the local citizenry and the total citizenry of the state. Some of its duties and powers may not be delegated. The basic role of the school board as a corporate entity is policy decision. Participation of certain other governmental agencies in the planning or decisions on schools may be mandated or directed by law. The school board is free to engage specialists for counsel and to employ necessary executive personnel.

No one individual or agency such as a school board has a corner on foresight and wisdom. The school board requires the ideas of the professional staff and community. The administration needs the ideas of those who will work with the proposed new school plant. The administration and the school board need the services of specialists—architects, attorneys, consultants, engineers, inspectors, and others. Defining the needs for school buildings requires the developed community understanding and the broadened vision of local leadership.

The school authorities should seek and publicize pertinent information on school-plant needs. Some will be adaptable to one medium of expression, some to another. But all should be screened by the school board from the standpoint of a few common-sense questions. Will the information be helpful in making fair, intelligent decisions? Will it receive sympathetic attention? Is it complete and unprejudiced? Is it consistent with the principles of democracy? Will it be constructive both immediately and in the long-range school and community relationships? Is it presented in logical order?

The school board must make the final determination of the needs for school facilities except in those instances where its decisions are subject to review by a state agency, or public referendum, or some other local governmental agency. The role of the administration, staff, and other participating groups is to assist the school board in arriving at the best possible determinations.

STAFF INVOLVEMENT

The function of administration is to provide operative personnel who are capable of accomplishing the purposes of the schools and of executing the policies of the school board. To this end administration must see to it that personnel have the tools and space which they require for effective performance.

The competent administrator will consult his staff as to what they consider essential for doing their work. In so far as possible he should attempt to provide these needs. However, his perspective must be such

that he can see beyond his present staff. He must ask: will the staff ten, twenty, or thirty years from now want the same space provisions? Professional growth of present staff and replacements must be considered. If he can meet the space needs of the present staff efficiently without building these needs inflexibly into the structure, he should do so. If he must build them into the *facilities*, he should, if possible, do so in a manner which will facilitate change at some future date. This problem has been discussed in the previous chapter.

The thought stressed here is that the physical facilities considered essential by a given staff today may not be identical to what the same staff will want in the future. Staffing is bound to change, and the thinking on essential features may be very different. The leader who can get his existing staff to recognize this fact has overcome one of the major hurdles to wise decisions on plant needs.

Once they have accepted this perspective on needs for school facilities, the staff can do a great deal toward securing community agreement on school needs. The local school administrator will be in a better position effectively to invite the full participation of his staff. The school staff will need to be briefed regarding the plan of community organization. In some localities the teachers have steering committees which integrate with the advisory council. All the teachers have a public relations responsibility. Therefore, they should all be kept informed at frequent intervals by the school administration. Certain teachers, supervisors, and building principals are unusually talented as research persons and as staff consultants. There is no doubt that these staff members, properly distributed, will assist the lay committees with much basic fact finding, evaluation, and reporting. It is good policy for this work to be voluntarily accepted rather than assigned or required. The local school staff act as the first shock troops of consultantship in coordinated community planning.

The determination of means for carrying out the educational objectives of a community is a professional concern. The teaching methods, the learning activities, the subject matter, the working atmosphere—these are the competencies of the teaching and supervisory staff. Few administrators would want to enter a building program unaided by their teaching staffs. Few school boards would not take the initiative to sanction full consultation of the administrative leadership with the professional staff. The agriculture teacher, the music teacher, the primary grade teacher, and others have each and all given prior thought to the direction in which their work ought to branch. Therefore, the administrator needs to obtain a clear statement of the recommended needs from each of his staff.

The method of group organization for getting this product from the

staff is not greatly different than with the community. Large city systems use department heads, principals, and supervisors in more of a cabinet relationship perhaps. However, it is refreshing from time to time for cities to supplement such a line-of-staff cabinet relationship with group dynamics and have all the school employees working in coordination on future policy and programming. The preparation of educational specifications is scarcely a one-man job, although the chief administrative officer may have to be the chief interpreter, and it is clear that the administrator will need to call upon all his staff resources to meet the exacting decisions on economy, design, and arrangement of the proposed school plant. These school-staff studies furnish detailed information for ultimate decisions.

COMMUNITY PARTICIPATION

A survey of the community will disclose numerous private groups and agencies that have an interest in educational needs and proposals. The better-known groups are parent-teachers associations, taxpayers' associations, businessmen's service organizations, farmers' organizations, teachers' associations, women's clubs, professional societies, chambers of commerce, and civic-improvement associations. Other groups less frequently contacted who certainly have much at stake are labor organizations, university clubs, churches, fraternal groups, real estate agencies, industrial management, social workers, communication media, home loan institutions, and veterans' organizations.

These groups can be of great assistance to the school board in weighing needs for plant relative to other needs and in assessing the educational purposes and priorities of the purposes which the community sanctions. As long as the administrator can direct such groups toward these considerations, community participation has a real contribution to make. However, if they concern themselves with means, such groups are assuming a professional prerogative. This statement is not intended to imply that the public has no right to challenge existing professional practices. If they do, it is the responsibility of staff to interpret and defend their practices. If they cannot, then staff should reexamine what they are doing.

Competence in Technical Matters. A possible impression gained from the community approach to determining needs may be an ever-widening range of lay participation in technical decisions. Many excellent authorities advise keeping the technical planning group small and compact. They call attention to numerous instances of delay and waste where the school board and administration have abdicated their responsibilities to popular clamor and private pressures. They counsel the school ad-

ministrator to have a highly competent official family to make the necessary scientific studies and produce statements of building needs and proposed solutions. Each concept has its place in a comprehensive program, the broad participation for its value system and the compact technical planning for efficiency in carrying out the basic mandate of the public.

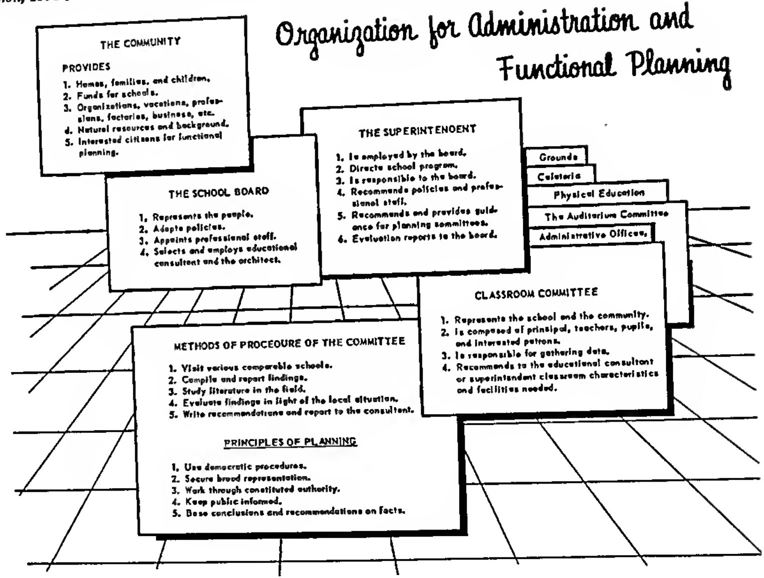
Two questions need to be settled. Since continuous participatory educational planning is supposedly an inevitable phase of current operations and the budgetary process, how far should one go in specifically channeling such public participation toward defining the school-building needs —that is to say, toward translating the desired objectives into space requirements, determining what should be done to the existing plant, and deciding what, if anything, should be added? And, secondly, what kind and quality of technical competence should the school board and school administration bring to bear upon the formulation of final determination of needs? The answer to the first question rests upon considerations of democracy and adaptability. The answer to the second rests upon considerations of efficiency.

The questions are fundamentally more a matter of practical procedure than of basic philosophy. In American local school governmental structure, the technical specialists must answer in the end for their reputation and acceptance to the electorate. Certain it is that whatever path he chooses to follow with respect to organization of lay participation, the administrative head of the school system will have plentiful contact with lay thinking through citizen councils, school-board committees and meetings, publicity efforts, and the daily give and take of public relations. Included in these public contacts will be community planners and leaders, financiers, businessmen, and persons experienced in the building trades.

Allocation of Responsibility. Public participation in educational planning may be a difficult step to take. There is a chance that vested interests may become so firmly established that they preempt the authority which is granted by statute to the school board. There is a risk that certain individuals may seek a personal advantage or domination that is rather complicated to unravel.

While the structural rights of the electorate to vote taxes and bonds are legally prescribed, the very thought of the exercise of lay intelligence in operational planning is taken by some professional personnel as a reflection on their own personal competence. Perhaps due to perspective and background, some professional personnel find themselves inept at handling lay participation successfully. Certainly if they do not know how to get participation and what its functions and purposes are, it may be a dangerous procedure to undertake.

Fig. 2-1. The complexity of a school-plant program makes it an object lesson in democratic procedures. (*Designing Elementary Classrooms*, U.S. *Department of Health, Education, and Welfare, Office of Education*, 1953.)



While it is helpful to know the views of the opposition, if any, and to get all the facts and viewpoints, there is a grave risk that minority rule will result where full community representation has not been obtained from the beginning. Strong administrative leadership, thorough preplanning of the community participation, and a good sense of timing on the part of the board of education as to when the needs are urgent seem to be the prerequisites for coordinated study of school needs on a community basis. The alternative is to fall back entirely on the statutory power of government, as represented in the local school board, which is only to invite the hazard of not bringing about changes in the school system fast enough to keep up with the deliberative views and wishes of the public.

Since the initiative for school-building programming is vested legally at the local level, an orderly plan of community coordination is needed for the local school unit. There should be a plan that joins the community, the school board, and the employed professional staff in a synchronized effort directed toward a common goal. The process should create mutual respect through better understanding and promote maximum efficiency by cultivating the creative and productive capacities of all concerned. The ways and means of achieving this mutual understanding are discussed in the following section.

Coordination of Community Participation. The extent and character of community organization will depend upon local circumstances. In those states where a central agency has promoted the plan of advisory community councils and worked out detailed procedures that release community energies without encroaching upon the structure of governmental responsibility, a well-organized local planning committee technique has flourished.

The coordination of community participation must be based on a *plan of action*. The work of the Federal School Facilities Survey and the magnitude of school building that the nation has faced prompted a renewal of research on the methods of preparing an orderly plan. There are proponents of both limited and broad plans of action. The advocates of limited plans argue that the time and place for formulating educational needs is not when designers and business officials under great pressure are trying to get essential schools built, that the need for classrooms is too urgent for involved deliberations, that school-plant planning is a job for specialists who work together more effectively as a closely knit team than if interfered with by untrained laymen. In this type of planning the school board comes to rely on authority for most of its decisions, the pronouncements of the state department of education concerning educational objectives, curriculum, and methodology, the published minimum standards, the traditional school services or class-

room arrangements or pupil-station concepts, and the definition of plant capacity as simply a statistical ratio to enrollment estimates. The limited plan may allow somewhat for "trends" in methods of teaching and for enrichment as a sort of local luxury and give some consideration to transportation and boundary changes, but the chief emphasis will be on expediting the new construction from recognition of need, studies by specialists, and necessary decisions to occupancy of the structure within perhaps two years.

The broader *plan of action* involves more segments of the community and generally takes somewhat longer. The same tasks are accomplished by both plans and the same scientific procedures are used to solve specific problems. However, the broader plan of action may operate from different premises—that the educational solution should be value centered rather than statistical centered. The broad approach begins with a clear understanding of what the community expects the schools to accomplish—their purposes. Leadership is exercised to get understanding that purposes may change. It tries to discover total needs to carry out purposes, not just school-plant needs. It weighs all needs in deciding what facilities are required to accomplish functional goals.

In the broad approach thinking is not restricted to present operational practices. It excludes no new constructive proposal whether it be longer school hours, more days of school, more informal and responsive learning activities, and worthwhile educational services made available to more people. It is hoped by advocates of the broader plans of action that the schools will not become educationally obsolescent quite so soon, but in any event that the schools will be closer to the recognized needs of the community.

Citizens' Advisory Committees. The coordination of community participation can often be accomplished in large part through organized lay advisory committees. Such committees are seldom and probably should not be organized expressly for or limited in their scope to a school-building program. But the building program is so definite and tangible in nature that lay committees usually find satisfaction in considering it.

The present trend is to tie in all community interests with a citizens' planning committee. Such an advisory council is generally acknowledged to be a means of (1) discovering unmet needs and (2) defining public sentiment as to the demand for services.

From reported experience, the advisory council will be more creative, more independent, and better supported by all elements of the community if it is so constituted as to embrace the whole program of the school system. This leads to the question of how such a council is started. There are, it seems, many ways that councils have been initiated or adapted, and there may be no single answer, any more than one can say

in advance for how long a time an advisory council should continue in operation. Very often a school-board resolution is the basis or stimulation. The customary approach is to make an analysis of the power complex of the community (a study that the PTA might initiate) and then to invite members from all dominant groups and crosscurrents of the area. The parent or central planning organization should be a delegate group representing many interests, not just individuals. It is important to have a membership chosen because of their broad interests more than their bias toward any symbiotic group from which they were selected. Provision for regular redesignation or alternation of membership on the planning committee will help to avoid self-perpetuation.

Organized advisory councils must have definite problems on which to work if they are to sustain interest and be productive. Usually citizens' committees are created for specific and limited purposes: to advise the school board on needed community services; to consider a major expansion of the program, such as a junior college; to study the community factors which determine the need for expanding the elementary schools; to investigate the vocational program on the secondary school level; to counsel with the administration and school board on the financial support of a building program; etc. When the task is completed, the committee should be terminated or reconstituted for new tasks. Often a central planning committee will continue on broad problems during the life of numerous temporary subcommittees.

Generally school-initiated citizens' advisory committees are *ad hoc*. Thus the school board of Cypress-Fairbanks Independent School District, when organizing three major committees—policy, curriculum, and population and resources—to study the needs and resources of the district, mailed a letter to each committee member similar to the following: [1]

Mrs. O. G. Speer
Fairbanks, Texas

Dear Mrs. Speer:

The obvious need for additional permanent buildings for our schools has been the subject of much discussion during meetings of the Board of Education of the Cypress-Fairbanks Independent School District during the past year.

Rather than enter a building program hastily, however, the Board of Education has decided to make a complete study of the needs and resources of our entire school district. The information collected in such a survey will then be used by the Board in planning school facilities that may be needed within the next five or ten years.

Several committees are being formed under the sponsorship of the Board of

[1] From *Final Report of the Citizens' Survey Committees of the Cypress-Fairbanks Independent School District*, Board of Education, Cypress-Fairbanks, Tex., 1953, p. 2.

Education, and each committee will be responsible for conducting a part of the survey. Citizens throughout the school district are being asked to serve on these committees, and I would appreciate your serving as a member of the Curriculum Committee, under the chairmanship of Mrs. Molly Huffmeister.

I hope you will accept this appointment for service on this committee. Your chairman will notify you of the time and place of the first meeting.

Very truly yours,

C. H. Juergen,
President of Board

Many feel that a desirable flexibility is achieved with *ad hoc* committees. As illustrated above the invitation to serve on such committees can outline the committee structure, establish its status as advisory with respect to certain broad questions, and make the termination date for such committees dependent upon their purpose. The school authorities are able to establish continuity if they desire by initiating successive *ad hoc* committees.

On the other hand, the possibilities of a permanent citizens' organization are illustrated in the constitution of the Educational Advisory Council in Battle Creek, Michigan: [2]

Article I—*Name.* The name of this organization shall be the Battle Creek Public Schools Educational Advisory Council.

Article II—*Object.* The object of this organization shall be to promote effective cooperation between the teachers and the parents, to foster a better understanding of local school problems, to discuss educational policy and practice, to make suggestions, and to provide acquaintance with general educational trends.

Article III—*Policies.* This organization shall be non-commercial, non-sectarian and non-partisan, and shall not seek to direct the technical activities of the schools or to control their policies.

Article IV—*Membership.* Presidents of the local PTA units and one other parent of opposite sex than the president, the principal of each school, president of the Battle Creek Teachers Association, chairman of the Principals and Supervisory Group, chairman of Maintenance and Custodians Group, chairman of the Secretaries and Clerks Association, superintendent of schools, officers of the Battle Creek Council of Parents and Teachers and four additional citizens selected at large by the Executive Committee. . . .

Article V—*Officers and their election.* The officers of this council shall be: (1) a president, (2) a vice-president, (3) a secretary, (4) a treasurer. These officers shall be elected by ballot at the annual meeting in November and shall hold office for one year, or until their successors are elected and qualified.

Article VI—*Meetings.* At least six meetings shall be held each year during the months of October, November, January, February, March, and April on the

[2] *The American School Superintendency,* Thirtieth Yearbook of the American Association of School Administrators, Washington, 1952, pp. 157–158.

first Monday evening. Special meetings may be called upon one week's notice. The annual election of officers shall be held at the time of the November meeting.

Article VII—*Executive Committee.* The Executive Committee shall consist of the president, the immediate past president, vice-president, secretary, treasurer, the superintendent of schools, the president of the Battle Creek Council of Parents and Teachers, the president of the Battle Creek Teachers Association, the chairman of the Principals and Supervisors Group and four members elected to the Educational Advisory Council and selected at large from organizations in the community by the Executive Committee. (These include Women's Club Federation, Veterans' Council, Labor, and Chamber of Commerce.)

Article VIII—*Dues.* Dues shall not be charged. Contributions from local PTA units will be accepted for such expense as may be incurred.

Article IX—*Amendments.* These By-Laws may be amended by a majority vote at any meeting of the Council, provided notice of any proposed amendment shall have been given at a previous meeting or provided the Executive Committee shall have ordered submission of the proposed amendment and so notified each member in writing at least ten days before the meeting.

An important issue may exist as to whether lay advisory committees should function as part of the local governmental unit or operate entirely independently. The American Association of School Administrators has emphasized in its Thirty-second Yearbook that superintendents who fail to act or lead may find community groups acting independently, which is hazardous to good educational programs. Granted there is considerable uncertainty in nondirected community concern for schools, the outcome is not necessarily destructive. An instance may be cited from the school-facilities section of a report of the Houston Forum on Education, an independent council, which recommended:

Due to the terrific increase in population, we are faced with an immediate need for many new school buildings.

These schools should be built now with money obtained by voting bonds in an amount large enough for foreseeable future as well as present needs.

State bond laws should be clarified or revised to allow the School Board latitude in more efficient construction of its buildings.

Schools should be considered a part of the community and their facilities made available for community use, including recreation. School and park sites should be planned for joint use. Schools should provide certain facilities and the city and recreational agencies the recreational leadership.

The School Board should set and make known a definite minimum standard for equipment, supplies and furnishings for all schools.

On the whole it is better to have citizens advisory committees initiated by the school authority and working in close conjunction with their local-school-district unit. This helps ensure that they will have the full benefit of technical information and professional assistance. The main committee may be designated as a steering group, while variously named

subgroups study and report on specific problems. No single organization can be expected to solve all problems; frequently several committees of community workers will simultaneously be conducting constructive studies of the same or closely related problems. The affiliation of subgroups need not always be formal or authoritarian. In fact, veterans' groups, patriotic societies, agricultural enterprises—any number of symbiotic groups in the community—may be connected only by some common interests and for an exchange of views. Active study groups can be formed of members of these loosely related groups.

All committees are advisory in character. They generally have no vested legal status. They should avoid appearance of becoming pressure groups. If they are privileged, it is only because they have the diligence and energy to recognize the proper issues, to determine the factors and facts, and to try to look at all sides of every question. The school board is responsible in the final analysis for the time element—they alone are legally charged with providing an efficient school system, expending the public monies economically, employing the staff, and establishing the operational policies. Moreover, the central advisory committee cannot substitute its judgment for that of the electorate, who may in due process be called upon to vote taxes or authorize bond issues.

Procedures in Community Participation. The local school administrator cannot afford to call upon the time and energy of local citizens and then leave the group to drift rudderless or to stumble upon their strategy out of inexperience. The local school administrator has to make long and arduous preparation for the initial meeting of a citizens' planning group.

The essential advance preparation falls into four categories:

1. There should be submitted an analysis of available research on the problem. This analysis may consist of a small mimeographed brochure of leading quotations. *Education Index* and *Encyclopedia of Educational Research* are time-saving devices for sorting through the available literature.

2. There should be made available a summary of local studies that have been made to date as they relate to the major problems under consideration. These may consist of evidence as to need, data on community factors, tabulation of annual reports, school-board resolutions, and the like. Visual materials, such as floor plans of existing buildings and maps, can be introduced to clarify the reality of the problem.

3. There should be on display a collection of background readings. These may consist of school-survey reports, magazines, professional books, brochures, technical pamphlets, laws and codes, state department guides, etc. Among the more common references for school-building study are *American School Board Journal*, *Nation's Schools*, *School Executive*, *The American School and University*, *Architectural Forum*, *Architectural*

Record, *Progressive Architecture*, and a variety of published school surveys. Sources for further information are Association of School Business Officials, National Council on Schoolhouse Construction, American Council on Education, National Recreation Association, U.S. Office of Education, and National Education Association (*Review of Educational Research* and *Research Bulletin*). The references on school plant in the past two decades number in the thousands. Excellent technical pamphlets are being published by universities and private-consultant agencies. The simplest way to keep abreast is to peruse annotated bibliographies.

4. There should be presented a detailed list of the fact-finding jobs and specific inquiries to be made. This suggestion may seem to be logically out of order, but psychologically it generally is sound. Such a list, if basically practical and effective, does not at all limit the freedom of the committee to select and formulate the broad issues and the major problems it will seek to resolve. On the other hand, it does convey a spirit of getting down to business which is most important. It shows everyone that there are jobs to do. Perhaps of all the actions taken by the local school administrator in order to make a plan of community coordination succeed, none is more important than composing a lengthy, detailed, exacting list of the specific tasks that can and need to be accomplished. He may well seek extensive advice on this part of his preparation. Yet his list seldom will be complete; many ideas and even better ideas will come from the committee as it goes to work.

The central planning committee must define the broad issues with which it intends to deal. The following migbt serve as an agenda:

1. What is the nature of the persons to be served by the school system?
2. What kind of provisions shall the school system supply to reach the desired objectives?
3. What organization of the school staff will be most functional?
4. What changes should be made in the school activities that are offered?
5. What kind and amount of physical-plant facilities are needed to accommodate the learning activities?
6. What standards are most efficient and economical?
7. What steps are required to make adequate financial support available?

Thus the lay groups will evaluate the local factors with respect to scope, objectives, policy, program, and resources. A choice must be made among the numerous possible specific studies. Here again the local school administrator's experience is invaluable. And the subcommittees must be constituted, inducted into the planning, thoroughly informed, and placed on their own work-production schedule.

The frequency of lay committee meetings ordinarily should not exceed twice a month. Staff work proceeds between meetings. A uniform system of records is vital; such records include all technical reports, all illustrative material, and all conclusions. Together they comprise a portfolio of records and reference materials. The lay committees should have a quiet, comfortable, convenient place to meet. They should have some supporting facilities, usually a permanent office space, with secretarial assistance, and a chance to travel and see what other school systems in other communities are doing.

CONTRIBUTIONS OF SPECIALISTS

The employment of consultant services in connection with lay advisory committees is almost standard procedure—if only that the local administrator seeks advice on preplanning from a nearby university. Where the community action programs have been reported as very successful, the school boards have employed an educational consultant. Why is a consultant useful? He is usually objective in his approach. He introduces scientific techniques of established merit and thus economizes time and effort. His speciality is judgment, based on experience in a wide variety of communities. He has the time and detachment to direct systematic research. He is skilled in editing and presenting the necessary reports. He can serve impartially the interests of the lay groups and the responsible professional staff working under the demands of their jobs. He can support with his prestige the final conclusions as presented to and adopted by the local school board.

Since the turn of the century when a rapid increase in the property holdings of local school districts became manifest, school-building specialists and consultants have frequently undertaken to describe a sound *plan of action* for the community school-building program. Little that is new has been added to the fundamental principles and problems expressed by early writers; perhaps the fundamental principles are reasonably obvious to any observer of American school structure. But considerable refinement in regard to specific techniques for determining the future school-plant needs of a community and for adapting plans and designs to the local understanding of educational needs has been achieved in recent years and reported in the professional literature. From the frequency of professional articles that reiterate the constant theme of participatory planning, one is tempted to surmise either that some local school districts must be apathetic and lax in their preplanning and leadership or that a sufficiently simple, obvious, and self-motivating plan of action for community coordination is not yet widely understood.

The general view of educational consultants has been concisely sum-

marized in a brochure published by the Texas Engineering Experiment Station.[3]

Although the exact approach to long range planning should be determined by the community itself, a general procedure is outlined here as a guide in determining a more precise procedure tailored to fit your individual community. This general procedure consists of finding the answers to EIGHT QUESTIONS. The first three questions concern the educational phase, and the last the financial phase. Find the answers to these, and you will have the basis for a long range school building plan for your community.

1. What will be the community's educational policy?
2. What kind of a teaching program will best serve the community?
3. What curricular changes will be needed?
4. How many children will be served?
5. What facilities will be needed?
6. Where will new schools be located?
7. To what extent can the old building be used?
8. How much money can be raised?

It is proposed that a statement of policy covering these eight questions be deliberated by public forums, by group discussion within service organizations, and by leading educators; that a comprehensive community study be made to bring forth and interpret facts on the occupational demand for high school education, the cultural interests and the civic problems of the community; and that a scientific measurement of the performance of pupils be made, since "...if you are going to build school buildings, you must know exactly what kind of a teaching program will be carried on inside and outside these buildings."

The record of the central advisory committee in Danville, Illinois, is typical of the programming that may result from participatory planning. Subcommittees of the advisory committee were named for general curriculum, kindergarten, junior high, recreation, and adult education. Each proposed the staffing, curriculum, and facilities needed to provide the services deemed desirable in its special-interest area; and from these reports the central committee established a composite statement of specific policy that the entire community would support.

Where community participation is built around the services of educational and architectural consultants, the procedure is (1) organization of study outlines, (2) directed research, and (3) conference evaluation of facts and factors.

The administration may seek the assistance of specialists or consultants at various stages from the initial identification and definition of needs to the completion of working drawings and specifications. They may be

[3] William W. Caudill, *Take a Good Look at Your Schools*, Texas Engineering Experiment Station, A & M College of Texas, College Station, Tex., 1950.

asked to direct or to conduct special surveys of school-building needs. These specialists can be expected to know a great deal about school buildings per se. Their recommendations on plant, however, should not be allowed to outweigh other essential steps which take precedence in attaining high-quality education. Their backgrounds can and should cause them to disagree with one or more of the other participating groups. Their perspective is most valuable in avoiding mistakes made in the past and in keeping abreast of the best developments in the area of school construction.

RELATIONS WITH OTHER GOVERNMENTAL UNITS

The ability of a school system to proceed with a capital program often involves agreements with other units of government. The state may require approvals or enforce minimum standards. This is a most serious problem for a community concerned with the quality of its schools, because the state agency enforcing the state requirements on school buildings may be uninformed about the other needs of the schools. The county or other municipality may have certain legal controls over the capital program of the schools. Such controls may handicap the schools unless the agencies exercising them understand the needs of the schools. Moreover, even where legal controls are not involved, the schools cannot afford to provide competing and duplicating facilities or to ignore the capital program of other local governments. Those responsible for schools must be equally informed relative to other needs and plans affecting the area. Such problems of intergovernmental relationships will be discussed in subsequent chapters.

The planning and decisions of other units of government serving an area cannot be ignored in decisions on school-building needs. The administrator must establish cooperative working arrangements with regional and community planning agencies. There should be arrangements for an exchange of factual data, probable needs, and future plans among all local governmental units in the area. Where state, regional, or county bodies are conducting studies and formulating plans for the reorganization of local-school-governmental units, these studies and plans should be examined to determine their implications for school-facility needs. Where state or other governmental units have the power to review or make final decisions on school-building matters, such agencies should be involved at the time the needs are being studied. To wait until plans are determined and programs formulated only invites trouble.

State Leadership and Guidance. The local school administrator should take full advantage of state resources and services in determining local school needs. State-sponsored area studies, such as those conducted in

Michigan, for example, have several advantages. Such studies conducted on a regional or county basis make it possible to see needs unhampered by existing governmental boundaries. It is often found that needs can best be met by reorganizing the existing local governmental structure for schools. Furthermore, the broad participating approach when recommended by the state tends to remove local suspicion that participation is a device for gaining public support for the preconceived plans of the local administration.

Another advantage of state leadership in helping localities in determining needs is the sharing of know-how. State agencies are in a position to compare procedures used at various times in different localities and to sift out the best practices. Some of the plans for area or local studies, such as those in Michigan and Texas, contain numerous practical suggestions for organizing participation in the determination of needs. Methods of inquiry are outlined. Some states, such as New York, have prepared detailed guides for conducting various phases of the inquiries.

A study of the various state manuals or other publications would indicate that there are at least five characteristics of a good community approach to determining school needs through well-organized participatory planning

1. A working outline is developed in advance in considerable detail as a guide for planning groups.
2. The tasks performed by various groups are such as fall within their particular competencies.
3. The subgroups report to a central advisory committee.
4. The work of building specialists is not necessarily impeded by deliberative processes.
5. It is held that interested members of the community, both laymen and teachers, are capable not only of understanding school needs but of having an active share in making the decisions.

SUMMARY

The school administrator's role in a school-building program being essentially that of leadership, he must recognize the potential contributions each group can make to decisions on needs and plans. At the same time he must have the vision to secure the kinds of agreements that will contribute to the quality of schools.

The function of the board of education operating under state law is that of policy decision. Also, the school board shares with the administrator the responsibility for interpretation and for establishment of wholesome relationships. The administrator functions through his staff in carrying out the educational objectives of the community. He should involve the school staff not only in prepa-

ration of educational specifications but in agreement on long-range utilization of the facilities as well.

While community participation is inevitable in the structure of the American school district, the administrator usually has a choice of ways to follow in planning for community involvement. In general, either he may limit the planning group to a few specialists and depend upon informal or incidental contacts for his community relations, or he may deliberately adopt a broader plan of action, such as through a citizens' advisory council, to engage all segments of the community in attaining a clear understanding of the purposes, needs, and ways or means.

Where citizens' committees exist, their function in reaching agreement on needs is only advisory. The school administrator should help with their agenda and source materials and serve as technical consultant. He must be prepared to supply research data, facilities for study, and guidance where necessary for the purpose of ensuring intelligent and balanced treatment of the various issues involved. The research and experience contributed by qualified consultants aids a community to take a systematic approach to its long-range requirements.

Other units of government may have an interest in the final agreements. For example, the responsibility of the state cannot be ignored. Many states supply supplementary leadership and counsel in the making of basic decisions. The controls of law and those exercised by overlapping governmental agencies must be known at the preliminary planning stages of the program.

DISCUSSION PROBLEMS

1. What are some of the possible problems which might be avoided through proper involvement of the community and staff in the planning of a building program?

2. Who is responsible for organization and leadership of school-staff participation in a school-building program? How much time should be allowed for the process of staff work?

3. Outline the agenda for a series of architect–school-staff conferences. What visual aids may be introduced?

4. How may a school administrator increase his understanding of the community? Illustrate the influence that the history of a community can have on the timing of a school-building program. Show how wider area factors often affect educational decisions in component districts.

5. How can a school superintendent tactfully bring to the attention of a tax-minded school board the impending necessity of additional school construction and modernization of existing facilities?

6. Illustrate the advantages of having a report of a preliminary survey of the school-building requirements of a district prepared with the advice and assistance of an educational consultant. Should this be a "cooperative study"?

7. The competencies and interests of various groups of people must be coordinated in a school-building program. The groups include citizens, administrators, teachers, custodians, architects, engineers, consultants, and other

experts. Show on which factors each of these groups may be expected to contribute the most. Among the factors in the school-building program are (*a*) basic needs of the pupils, (*b*) structure and materials, (*c*) community needs, (*d*) construction costs, (*e*) learning methods and curriculum, (*f*) environment, (*g*) school organization, (h) public relations, (*i*) esthetics in architecture, (*j*) maintenance

8. What measures may the state department of education take to ensure an orderly, enlightened, and accurate approach to school-building projects on the part of local school authorities?

9. What provision should be made for the architect to integrate his competencies with that of other specialists and interested parties? Describe in detail a planning center. Where should public relations enter the picture?

10. Show how state financial aid has often been accompanied by a master plan for the redistricting of school-attendance areas.

11. Prepare a plan for initiating a citizens' advisory committee in the public school program. Give the pros and cons of establishing permanent status for a citizens advisory committee.

12. What weight or consideration, in view of the usual turnover of school personnel, should be given the recommendations of individual teachers respecting the plans for those sections of new buildings where they shall work?

RELATED READINGS

American Association of School Administrators: *The American School Superintendency,* Thirtieth Yearbook, Washington, 1952.

Barrows, Alice: *Assistance in School Plant Planning as a Function of State Departments of Education,* U.S. Office of Education No. 6, Washington, 1940.

Beach, Fred F.: *The Functions of State Departments of Education with an Inventory of the Services Provided by the 48 Departments,* U.S. Office of Education No. 12, Washington, 1950.

Charters, W. W., Jr.: "Person-to-Person Influence," *Nation's Schools,* 56:49–52, November, 1955.

Engelhardt, N. L.: "Adequate School Plant, Communities' Responsibility," *School Executive,* 68:11–14, January, 1949.

Hamlin, Herbert M.: *Citizens' Committees in the Public Schools,* Interstate Printing Company, Danville, Ill., 1952.

Hamon, R. L.: "State School Plant Assistance," *School Executive,* 68:48–50, November, 1948.

Hedlund, P. A.: "Support for a Building Program Is Assured When Citizens Help Develop It," *Nation's Schools,* 44:51–52, December, 1949.

Hess, B. A., and A. E. Wohlers: "What Is the Role of the Principal and the Staff in Planning the [illegible] School Plant?" *Bulletin of the National Association of Secondary* [illegible] 4[illegible] 1956.

Hill, O. E.: *Citize*[illegible]itu[illegible] ative Research, Teachers College, Columbi[illegible]

Hodge, Paul R.: *Work of Citizens Advisory Committees*, Gulf School Research Development Association, University of Houston, Houston, Tex., 1958.

Hull, J. H.: *Lay Advisory Committees to Boards of Education in the United States*, California Association of School Administrators, 35 North Raymond Ave., Pasadena 1, Calif., 1949.

Metropolitan School Study Council: *Citizen Advisory Groups for School Building Programs*, Bureau of Publications, Teachers College, Columbia University, New York, 1951.

———: *The Unmet Needs Approach to Public Participation*, Bureau of Publications, Teachers College, Columbia University, New York, 1951.

National Citizens Commission for the Public Schools: *How Can Citizens Help Their Schools?* New York, 1953.

Punke, Harold H.: *Community Uses of Public School Facilities*, King's Crown Press, New York, 1951.

Reilly, William J.: *Successful Human Relations*, Harper & Brothers, New York, 1952.

Seagers, Paul W.: *Community Participation in School Building Planning*, doctor of education project, Teachers College, Columbia University, New York, 1950.

———: "Tapping Community Resources in Planning School Buildings," *American School Board Journal*, 124:25–27, January, 1952.

State Department of Education: *Suggested Procedures for Communities Planning School Building Projects*, Bulletin 91, Hartford, Conn., 1958.

Sumption, Merle R.: *The Citizens School Building Survey: What to Find and Where to Find It*, Division of Field Services, College of Education, University of Illinois, 1951.

——— and Jack L. Landes: *Planning Functional School Buildings*, Harper & Brothers, New York, 1957.

Westby, Cleve O.: "A Community Plans Its School Buildings," *Educational Leadership*, 6:285–289, February, 1949.

Yauch, Wilbur A.: *Improving Human Relations in School Administration*, Harper & Brothers, New York, 1949.

experts. Show on which factors each of these groups may be expected to contribute the most. Among the factors in the school-building program are (a) basic needs of the pupils, (b) structure and materials, (c) community needs, (d) construction costs, (e) learning methods and curriculum, (f) environment, (g) school organization, (h) public relations, (i) esthetics in architecture, (j) maintenance.

8. What measures may the state department of education take to ensure an orderly, enlightened, and accurate approach to school-building projects on the part of local school authorities?

9. What provision should be made for the architect to integrate his competencies with that of other specialists and interested parties? Describe in detail a planning center. Where should public relations enter the picture?

10. Show how state financial aid has often been accompanied by a master plan for the redistricting of school-attendance areas.

11. Prepare a plan for initiating a citizens' advisory committee in the public school program. Give the pros and cons of establishing permanent status for a citizens advisory committee.

12. What weight or consideration, in view of the usual turnover of school personnel, should be given the recommendations of individual teachers respecting the plans for those sections of new buildings where they shall work?

RELATED READINGS

American Association of School Administrators: *The American School Superintendency,* Thirtieth Yearbook, Washington, 1952.

Barrows, Alice: *Assistance in School Plant Planning as a Function of State Departments of Education,* U.S. Office of Education No. 6, Washington, 1940.

Beach, Fred F.: *The Functions of State Departments of Education with an Inventory of the Services Provided by the 48 Departments,* U.S. Office of Education No. 12, Washington, 1950.

Charters, W. W., Jr.: "Person-to-Person Influence," *Nation's Schools,* 56:49–52, November, 1955.

Engelhardt, N. L.: "Adequate School Plant, Communities' Responsibility," *School Executive,* 68:11–14, January, 1949.

Hamlin, Herbert M.: *Citizens' Committees in the Public Schools,* Interstate Printing Company, Danville, Ill., 1952.

Hamon, R. L.: "State School Plant Assistance," *School Executive,* 68:48–50, November, 1948.

Hedlund, P. A.: "Support for a Building Program Is Assured When Citizens Help Develop It," *Nation's Schools,* 44:51–52, December, 1949.

Hess, B. A., and A. E. Wohlers: "What Is the Role of the Principal and the Staff in Planning the New School Plant?" *Bulletin of the National Association of Secondary-school Principals,* 40:60–64, April, 1956.

Hill, O. E.: *Citizens at Work,* Institute of Administrative Research, Teachers College, Columbia University, New York, 1956.

sions which have to be faced by the school board in this approach to providing school buildings. He needs this background not only to guide the school board but also to provide the information which it will require in order to make intelligent policy decisions.

BASIC ISSUES TO BE DECIDED

The formulation and adoption of a well-conceived long-range program for providing needed school facilities involves at least fifteen basic issues or problems upon which school-board policy decisions are required. These are:

1. Should the school system undertake the formulation of a long-range school-building program?
2. What studies should be undertaken to develop such a program?
3. What staff and resources should be provided to do the research and planning?
4. What standards should be approved for evaluating existing facilities and planning new ones?
5. How should existing facilities be evaluated?
6. What steps should be taken to increase the utilization of available plant?
7. What should be done in planning to hedge against possible errors in long-range enrollment estimates?
8. What steps should be taken to guarantee that all possible solutions have been conceived and analyzed in long-range planning?
9. How should the best solution (project) for a given situation be chosen?
10. What should be the basis for assigning priorities to various projects in the long-range program?
11. What sites should be acquired in advance of actual project advancement?
12. How much documentation for the long-range program is required?
13. What provisions should be made for continuous review of the program?
14. What is implied in formal adoption of a long-range program?
15. How can public acceptance of the program be secured?

NEED FOR LONG-RANGE PLANNING

Authorization to approach individual school-building problems as a phase of long-range planning or as part of a long-range school-building program is not always easy to obtain. The school board may be skeptical of the value of such a program. It may be necessary to convince the

CHAPTER 3

The Long-range-program Approach

The needs for school facilities can be fulfilled in a variety of ways depending upon the actual conditions which exist in a given school system. Among the possible solutions are these: improved utilization of available school buildings, changes or improvements in existing facilities, additions to present plant, use of available community facilities, change of available community facilities to assure greater use for school purposes, and construction of new facilities of various types suitable to particular circumstances.

Determination of the best solutions to the defined needs requires intensive study and careful planning over a period of years. These studies will be outlined briefly in this chapter. The objective here is to provide the school administrator with a broad framework for the technical material contained in Chapters 5 through 11.

The objective of the studies and planning is to obtain school-board approval and community acceptance of a long-range program of projects (new facilities, remodeling or modernization of existing plants, additions to existing buildings, and other undertakings) which will fulfill the needs in the shortest possible time with due allowance for other important considerations. Few, if any, localities have the resources to finance and to advance to occupancy at one time all of the projects essential for meeting their school-building needs. Moreover, such considerations as existing debt, the need for averaging high and low construction costs, maximum utilization of existing plant, tax rates, tax limits, the desirability of spreading replacements and modernization of buildings over a period of years, site acquisition, and ability to plan and construct individual projects carefully all dictate a program to be completed by stages.

The school superintendent should know the major problems and deci-

ceived to assure adaptability. Many contingencies can be anticipated and plans made for adjusting to them with a minimum of waste. Many of the undesirable consequences of the piecemeal approach to school building can be circumvented through planning a school-building program before undertaking a specific school-building project.

A well-conceived school-building program strengthens long-range financial planning. It enables the locality with limited resources to attain the maximum educational return at any given time and to make a case for needed assistance from central governments. It enables a community to gear its immediate financial plans to its long-range financial requirements. It enables a locality to coordinate the financing of school buildings with other community financial requirements.

STUDIES REQUIRED

A broad program of study must be authorized in order to understand past and future trends and arrive at a judicious, constructive long-range school-building program for the area. In such studies the main factors to be considered are intergovernmental relationships, the local administrative unit, community characteristics, attendance or service areas, existing plant assets, transportation, community facilities, community plans, school-building standards, utilization of available school and community facilities, enrollment estimation, and possible solutions. These are outlined briefly below. A detailed outline of studies will be found in Chapter 5.

1. Community and educational survey
   a. Resources—cultural, economic, and educational
   b. Population—growth, migration, shifts, composition, characteristics
   c. Land use and housing
   d. Planning and development—industrial, commercial, residential, public works
   e. Trends—economic, ethnic, social, and cultural
   f. Governmental structure—general, school, and relationships within
   g. Private schools and educational activities of other community agencies
   h. Public school program—description, evaluation, possible changes
   i. Trends affecting future public school programs
   j. Special educational problems and needs
2. Technical school-facility studies
   a. Development of standards for school buildings
   b. Evaluation of existing plant
   c. Capacity and utilization of available facilities

board of the advantages of the long-range approach. Why should a school board today look ten years ahead in planning for schools?

The need for a long-range program or the value of long-term planning is sometimes challenged on the grounds that where conditions are changing rapidly much of the predicted need will prove to be in error, and the labor and expense involved in the preparation of a comprehensive master plan that anticipates future stages of the building program will be largely wasted. This can happen if the long-range plans are too detailed and not continuously reviewed. Long-range plans should not be confused with preliminary plans for particular projects, but should provide the basis of such preliminary plans. Not only would it usually be imprudent to locate a costly new school structure where in a few years it could not be used or to build it without regard to estimates of future enrollment; but also, in fact, it is better to build part of a facility well and to make arrangements for its later completion than to risk having the entire plant inadequate by shrinking it to present financial limitations.

The advantages of long-range school-building programming can be seen by examining the consequences of planning individual facilities to meet an immediate and obvious need without regard to total needs. Under this narrow concept each project is considered by itself as a replacement of a particular school building or as a new unit to accommodate past or immediate enrollment increases. The spaces provided in the new facility may reflect past educational practices in the locality or they may be based upon standards formulated by others without regard to the future educational programs that will be carried on in the particular facility. The locality in this instance relies upon short-range enrollment forecasts or past enrollment increases. It employs an architect to plan the building and advance the project to occupancy.

So limited an approach to school-building planning may have serious consequences. It can handicap and restrict the educational process for decades. It can consume resources for marginal, infrequently used, or difficult to fully utilize facilities and thereby delay the provision of essential spaces that could be fully and effectively utilized. It can lead to excess space and underutilized buildings for some grade levels or areas. It may result in a shortage of space and overcrowding in other grade levels or areas. It can mean duplication of school and community facilities, poorly located buildings, poorly utilized buildings, financial hardship, and waste. Worst of all, it may cause a deterioration in the quality of education itself by curtailing operating budgets where both annual and capital expenses depend upon the same tax base or by preventing a locality from making necessary improvements or adaptations in its educational program.

It is impossible to anticipate every contingency in planning buildings for long-range use. Yet many mistakes are avoidable. Plans can be con-

'he key specialist in conducting technical studies and developing a ;-range program is the educational consultant. At times it will be rable to refer certain technical problems to an architect or an en- 'er. The cost of the studies often may be reduced by assigning school to assist in the work. Of course, in a large school system with a con- ous school-building program the necessary specialist personnel will :mployed as an integral part of staff.

he educational consultant may be engaged to investigate and inter- the requirements, or he may be brought in only to evaluate local ;ment. If he is to do a thorough fact-finding and analysis job which take a year or more, he will have had the advantage of experiencing rst hand the impact of school and community factors. An alternative roach is for the school authorities, with or without the consultant's sement, to assemble carefully the documented information on en- nents, sites, community factors, educational plans, building capacities, t condition, and the like and then invite one or more recognized ialists to spend a short time in consultation on the final judgment and -range planning. The local staff may not have uncovered the same or in the same way that the school-building specialist would have if ad had the time and opportunity; and so this sort of consultant service being mere substantiation.

is best to engage a consultant near the beginning of the initial studies lanning so that he may acquire a knowledge of the community and to avoid errors in the long-range plans. The consultant's relation- to the school administration and board may be an informal out- vth of previous evaluations or field assistance, but for the school-plant it is advisable to have a firm contractual agreement. Stronger assist- results where such a firm agreement covers explicitly the expected nplishments, the degree of cooperation, the scope of responsibility, luration of the services, the termination date, and the fee to be paid. contract with the consultant is covered in Chapter 13.

the choice of an educational consultant the school authorities have ake a personal judgment on the basis of the job requirements and ompetence of the person or the institution which he represents. The ational consultant is not supposed to have the qualifications of an tect; his specialty is the educational applications of technical data. neral the consultant provides (1) assistance in broad, preliminary procedures, (2) guidance in analyzing data for use by com-) prep n of a report on the survey of requirements, (4) de- of applications that result in economy, such as the of specifications, (5) recommendation on policy of a wide outside experience, (6) review of to school-board endorsement. Often the educa-

d. Estimates of enrollments (by attendance areas with due consideration of transportation)
e. Program formulation and project sequence
f. Site evaluation and selection
g. Preparation of educational specifications

The technical studies involved in developing appropriate standards for school facilities, evaluating existing plant, utilizing available facilities, estimating enrollment, program formulation, and selecting sites are discussed in Chapters 6 through 11. However, certain observations are appropriate in seeking school-board approval of such studies.

In preparing the school-plant program the particular solutions adopted will be the result of the understandings held by various persons as to the economic, population, physical, social, cultural, and ethnic nature and trends of the community. These understandings will be somewhat different on the part of the school-board member, the consultant, the school administrator and his staff, and others concerned with the building program. An objective survey of community factors, however, will provide a common background of factual information for discussion and action. The scope of information to be secured would be virtually limitless except that through years of experience in the process of community surveying and with the many reputable fact-finding agencies at hand, the task is made fairly systematic and indeed an accepted part of the ordinary school-building program. Hence, it is a shortsighted policy to authorize the technical studies listed above without providing for a broad survey of community and educational factors which provide essential background for interpreting the results of other studies and for planning intelligently.

The community and educational surveys and the technical studies are an important phase of the participatory approach recommended in Chapter 2. Indeed, the caliber of these studies will determine to a considerable extent the outcomes of the participation. By providing objective factual background and findings for deliberation and study by lay and professional groups, such studies contribute to carefully considered statements of needs. Facts can do much to bring about agreement on the needs.

STAFF FOR STUDIES AND PLANNING

When it is convinced of actual need for a capital program, the school board must authorize the employment of specialist personnel necessary to avoid costly errors and to plan efficiently. The school superintendent is chosen with a view to his general executive qualifications for leadership. He is not expected to be a survey specialist, or even a school-building specialist.

The key specialist in conducting technical studies and developing a long-range program is the educational consultant. At times it will be desirable to refer certain technical problems to an architect or an engineer. The cost of the studies often may be reduced by assigning school staff to assist in the work. Of course, in a large school system with a continuous school-building program the necessary specialist personnel will be employed as an integral part of staff.

The educational consultant may be engaged to investigate and interpret the requirements, or he may be brought in only to evaluate local judgment. If he is to do a thorough fact-finding and analysis job which may take a year or more, he will have had the advantage of experiencing at first hand the impact of school and community factors. An alternative approach is for the school authorities, with or without the consultant's advisement, to assemble carefully the documented information on enrollments, sites, community factors, educational plans, building capacities, plant condition, and the like and then invite one or more recognized specialists to spend a short time in consultation on the final judgment and long-range planning. The local staff may not have uncovered the same facts or in the same way that the school-building specialist would have if he had had the time and opportunity; and so this sort of consultant service risks being mere substantiation.

It is best to engage a consultant near the beginning of the initial studies or planning so that he may acquire a knowledge of the community and work to avoid errors in the long-range plans. The consultant's relationship to the school administration and board may be an informal outgrowth of previous evaluations or field assistance; but for the school-plant study it is advisable to have a firm contractual agreement. Stronger assistance results where such a firm agreement covers explicitly the expected accomplishments, the degree of cooperation, the scope of responsibility, the duration of the services, the termination date, and the fee to be paid. The contract with the consultant is covered in Chapter 13.

In the choice of an educational consultant the school authorities have to make a personal judgment on the basis of the job requirements and the competence of the person or the institution which he represents. The educational consultant is not supposed to have the qualifications of an architect; his specialty is the educational applications of technical data. In general the consultant provides (1) assistance in broad, preliminary fact-finding procedures, (2) guidance in analyzing data for use by committees, (3) preparation of a report on the survey of requirements, (4) development of technical applications that result in economy, such as the preparation of educational specifications, (5) recommendation on policy and program in the light of a wide outside experience, (6) review of plans and proposals prior to school-board endorsement. Often the educa-

tional consultant is retained to study limited problems, such as the need for new schools, study of school location, scope of facilities for a given educational program, and financial ability of the district. Competent consultants will consider community factors and educational trends in treating even limited problems.

While the educational consultant works primarily with the administrative staff, he should be expected to present his information to the school board and lay committees. The consultant may agree to evaluate the curriculum, methods, and services proposed in connection with the school-plant modernization or expansion. Where he is invited to work with lay committees, the range of interests may include educational provisions for community needs that they identify. On the other hand, the consultant may be asked to help organize planning groups of the school staff with a view to preparing detailed educational requirements for the architect, and later advise on the basic plans and specifications for projects. The expense of employing an educational consultant deters many districts, but the potential economy should more than repay his nominal fees where adequate service cannot be obtained free of charge from state agencies.

The best policy is to have the consultant prepare a written report, conducting whatever first-hand investigations he considers necessary, such as inspection of the present plant, and to use the school staff to save part of the expense by gathering the major amount of the factual data under his general direction. Not only will most school systems need the extra labor and experience that a consultant can bring to the situation, but actually the presence of outside talent on occasion is found to vitalize and expedite a survey and to synthesize an acceptable master plan. It is common practice to retain the consultant on a per diem basis after the survey is terminated for the purpose of advising the board on architect's plans, specifications for equipment, and other decisions in carrying out the long-range program.

In small school systems the school administrator personally may have to organize his planning staff and prepare most of the technical reports himself. Enough detail is presented in Part Two to enable him to assume this responsibility where necessary.

STANDARDS AND PLANT EVALUATION

Approval of the standards to be used in evaluating existing facilities and planning new ones or changes in available ones is one of the most far-reaching decisions made by the school board. These standards largely define the need for school buildings. They have serious implications for

the capacity and utilization of available plant. They fix the future usefulness of new facilities.

Informing the School Board. School boards should be informed of the standards underlying the recommendations made to them by the superintendent of schools; otherwise, misunderstandings may arise later regarding recommendations on school buildings. The fact is that whoever decides upon the standards to be used is really making a most crucial policy decision—a decision which legally should be made by the school board in the absence of state requirements which, desirable or not, must be complied with. The superintendent of schools should recommend appropriate standards to the school board and invite a thorough review and discussion of these before seeking approval. Chapter 6 provides the background for developing appropriate standards to be so recommended. The problems of state requirements and local building codes are taken up in the same chapter.

Procedure for Applying Standards. Adoption of suitable standards is essential for evaluating existing facilities, but almost as important are the procedures to be followed in applying these standards. The importance of the decision on this matter may be seen by reviewing the purposes of this step and its place in long-range planning.

The inventory and evaluation of present school plant has several purposes. It determines how much of the program and population may be accommodated satisfactorily in present facilities—an estimate calling for considerable skill and experience. Besides the capacity and special facilities, the inventory shows where substandard conditions exist. Proper evaluation determines possible alterations to be made, the amount of essential outlay required for upkeep and preservation of plant values, and the degree to which the concept of modernization should be applied. The factors considered in evaluation of the plant-inspection data range from simple standards of sanitation, health, and safety to broader considerations of efficiency and utilization of plant spaces. The inventory of present facilities is an invaluable aid for reducing speculation and reaching common agreement on the disposition of physical assets. The question of priority in the correction of substandard conditions, for example, may be partially answered by screening the plant-inspection records.

The study of structural soundness, depreciation, and adequacy of the present installations is preliminary to intelligent determination of durability of existing facilities, whether it would pay to rehabilitate a substandard facility, the advisability of building alterations or additions to present structures, and a variety of other solutions that must be weighed and decided before final recommendations are made in the long-range plan. Of particular concern in this connection is the adequacy of the

school site—whether the location, size, and features of the site will protect the proposed investment. A factor rating of the school sites will show their economy and probable future usefulness and will substantiate the master-plan recommendations as to functional utilization, the wisdom of additions to present structures, and need for acquiring new sites.

Procedures for evaluating available facilities are presented in Chapter 7. The closely related problems of site evaluation are discussed in Chapter 11.

CAPACITY, UTILIZATION, AND ENROLLMENT

Determination of the steps which should be taken to increase the utilization of available facilities is one of the most difficult decisions which a school board must make. Determination of plant capacity in terms of a functional program is a highly technical matter. Utilization of a plant to capacity not only involves the physical aspects of the facility but also depends upon the efficiency of daily operations.

In the matter of measuring plant capacity and utilization the school board must depend upon the competence of its administration and the recommendations of its consultants. The problems, procedures, and standards for measuring capacity, the means for increasing utilization, and long-range factors involved are discussed in Chapter 8.

Long-range planning presumes long-range enrollment estimates, but the margin of error in estimates widens as the time span lengthens. This fact calls not only for careful study of community trends and factors in enrollment projections, with special attention to attendance areas, but also for flexibility and hedges against error in long-range planning.

The margin of error in long-range forecasts can be narrowed as shown in Chapter 9. General population forecasting is the concern of many community agencies. Participation of these agencies in the studies will be mutually helpful to the schools and the other agencies. The study of statistics of housing, population shifts, economic change, and vital statistics of the larger region often contributes to the accuracy of forecasts. Improved source data can improve estimates, e.g., a complete school census. Data on numerous significant community factors will help reduce the margin of error. Various contingencies which may arise often can be anticipated from the community survey.

Where there is a probability or a strong possibility that anticipated enrollment increases will be temporary, every possible solution which would avoid new construction should be explored: increasing the utilization of existing plant, transportation, renting, and emergency use of infrequently used space. If new construction cannot be avoided for such temporary increases, each of the following possibilities should be considered:

1. Facilities designed for successive use by different grade levels as the peak enrollment advances through the grades
2. Facilities designed for easy conversion for another use consistent with the long-range program
3. Facilities designed for easy conversion for other public or private use as institutions, homes, or offices
4. Temporary annexes which can be moved to other schools or other school systems, or adapted to other uses, or can be salvaged at a minimum loss

PROJECT SELECTION, PRIORITIES, AND SITES

Intelligent decisions in long-range planning depend upon conceiving all possible solutions, weighing each objectively, and selecting the best for the conditions which exist in each area. There is no formula by which a school board can determine whether all possible solutions have been explored except to ask intelligent questions such as these:

1. What solutions other than the one recommended have been tested?
2. Why was each rejected?
3. If the physical structure is sound and the site satisfactory, what uses could be made of a facility?

There are no universal standards for determining the one best solution. The right solution is relative to the facts brought out in the technical studies. Chapter 10 discusses the use of these facts in formulating a sound long-range program.

A community which has available resources to launch its complete building program without delay is indeed fortunate. Most communities carry out the program in stages because of financial considerations, the problems of accommodating pupils during construction, problems of site acquisition and clearing, the time required for the careful planning of the various projects, legal barriers, and other practical considerations. These considerations make it necessary to establish a sequence in which the projects in the program shall be undertaken.

A most difficult decision in formulating a long-range school-building program is the order in which various projects are to be undertaken. Without a sound basis for priorities, the program will not assure adequate facilities for all areas, all grade levels, and all objectives. Newly developed sections tend not only to get the most modern facilities but also facilities for a broad educational program. Older sections for decades tend to get the most obsolete and inadequate space with few, if any, facilities for a broad program. Too often elementary pupils are housed in cramped and unsatisfactory facilities while the high school program is being accommodated in elaborate buildings. Certain objectives, as shown in Chap-

school site—whether the location, size, and features of the site will protect the proposed investment. A factor rating of the school sites will show their economy and probable future usefulness and will substantiate the master-plan recommendations as to functional utilization, the wisdom of additions to present structures, and need for acquiring new sites.

Procedures for evaluating available facilities are presented in Chapter 7. The closely related problems of site evaluation are discussed in Chapter 11.

CAPACITY, UTILIZATION, AND ENROLLMENT

Determination of the steps which should be taken to increase the utilization of available facilities is one of the most difficult decisions which a school board must make. Determination of plant capacity in terms of a functional program is a highly technical matter. Utilization of a plant to capacity not only involves the physical aspects of the facility but also depends upon the efficiency of daily operations.

In the matter of measuring plant capacity and utilization the school board must depend upon the competence of its administration and the recommendations of its consultants. The problems, procedures, and standards for measuring capacity, the means for increasing utilization, and long-range factors involved are discussed in Chapter 8.

Long-range planning presumes long-range enrollment estimates, but the margin of error in estimates widens as the time span lengthens. This fact calls not only for careful study of community trends and factors in enrollment projections, with special attention to attendance areas, but also for flexibility and hedges against error in long-range planning.

The margin of error in long-range forecasts can be narrowed as shown in Chapter 9. General population forecasting is the concern of many community agencies. Participation of these agencies in the studies will be mutually helpful to the schools and the other agencies. The study of statistics of housing, population shifts, economic change, and vital statistics of the larger region often contributes to the accuracy of forecasts. Improved source data can improve estimates, e.g., a complete school census. Data on numerous significant community factors will help reduce the margin of error. Various contingencies which may arise often can be anticipated from the community survey.

Where there is a probability or a strong possibility that anticipated enrollment increases will be temporary, every possible solution which would avoid new construction should be explored: increasing the utilization of existing plant, transportation, renting, and emergency use of infrequently used space. If new construction cannot be avoided for such temporary increases, each of the following possibilities should be considered:

1. Facilities designed for successive use by different grade levels as the peak enrollment advances through the grades

2. Facilities designed for easy conversion for another use consistent with the long-range program

3. Facilities designed for easy conversion for other public or private use as institutions, homes, or offices

4. Temporary annexes which can be moved to other schools or other school systems, or adapted to other uses, or can be salvaged at a minimum loss

PROJECT SELECTION, PRIORITIES, AND SITES

Intelligent decisions in long-range planning depend upon conceiving all possible solutions, weighing each objectively, and selecting the best for the conditions which exist in each area. There is no formula by which a school board can determine whether all possible solutions have been explored except to ask intelligent questions such as these:

1. What solutions other than the one recommended have been tested?

2. Why was each rejected?

3. If the physical structure is sound and the site satisfactory, what uses could be made of a facility?

There are no universal standards for determining the one best solution. The right solution is relative to the facts brought out in the technical studies. Chapter 10 discusses the use of these facts in formulating a sound long-range program.

A community which has available resources to launch its complete building program without delay is indeed fortunate. Most communities carry out the program in stages because of financial considerations, the problems of accommodating pupils during construction, problems of site acquisition and clearing, the time required for the careful planning of the various projects, legal barriers, and other practical considerations. These considerations make it necessary to establish a sequence in which the projects in the program shall be undertaken.

A most difficult decision in formulating a long-range school-building program is the order in which various projects are to be undertaken. Without a sound basis for priorities, the program will not assure adequate developed facilities for all areas, all grade levels, and all objectives. New sections tend not only to get the most modern facilities but also facilities for a broad educational program. Older sections for decades tend to get the most obsolete and inadequate space with few, if any, facilities for a broad program. Too often elementary pupils are housed in cramped and unsatisfactory facilities while the high school program is being accommodated in elaborate buildings. Certain objectives, as shown

school site—whether the location, size, and features of the site will protect the proposed investment. A factor rating of the school sites will show their economy and probable future usefulness and will substantiate the master-plan recommendations as to functional utilization, the wisdom of additions to present structures, and need for acquiring new sites.

Procedures for evaluating available facilities are presented in Chapter 7. The closely related problems of site evaluation are discussed in Chapter 11.

CAPACITY, UTILIZATION, AND ENROLLMENT

Determination of the steps which should be taken to increase the utilization of available facilities is one of the most difficult decisions which a school board must make. Determination of plant capacity in terms of a functional program is a highly technical matter. Utilization of a plant to capacity not only involves the physical aspects of the facility but also depends upon the efficiency of daily operations.

In the matter of measuring plant capacity and utilization the school board must depend upon the competence of its administration and the recommendations of its consultants. The problems, procedures, and standards for measuring capacity, the means for increasing utilization, and long-range factors involved are discussed in Chapter 8.

Long-range planning presumes long-range enrollment estimates, but the margin of error in estimates widens as the time span lengthens. This fact calls not only for careful study of community trends and factors in enrollment projections, with special attention to attendance areas, but also for flexibility and hedges against error in long-range planning.

The margin of error in long-range forecasts can be narrowed as shown in Chapter 9. General population forecasting is the concern of many community agencies. Participation of these agencies in the studies will be mutually helpful to the schools and the other agencies. The study of statistics of housing, population shifts, economic change, and vital statistics of the larger region often contributes to the accuracy of forecasts. Improved source data can improve estimates, e.g., a complete school census. Data on numerous significant community factors will help reduce the margin of error. Various contingencies which may arise often can be anticipated from the community survey.

Where there is a probability or a strong possibility that anticipated enrollment increases will be temporary, every possible solution which would avoid new construction should be explored: increasing the utilization of existing plant, transportation, renting, and emergency use of infrequently used space. If new construction cannot be avoided for such temporary increases, each of the following possibilities should be considered:

ter 1, tend to get large amounts of space, and equally important purposes are denied space or satisfactory space. Chapter 10 contains a section devoted to the establishing of priorities for various projects in a program.

The inclusion of a project in the long-range program by itself does not justify the selection and acquisition of a site for the project. Not only is the long-range program subject to revision in terms of new facts or developments, but each project has to be carefully reviewed (see Chapter 10) before it is actually advanced.

Certain aspects of site selection are an integral part of long-range planning—site planning as a phase of community planning, development and adoption of standards for site evaluation or selection, plans for site locations, plans for utilizing sites, and similar matters covered in Chapter 11.

There are instances where it may be advisable to acquire sites in advance—indications of high future land values or probability of all available sites becoming built up. These will be explored in Chapter 11.

PROGRAM DOCUMENTATION, ADOPTION, REVIEW, AND ACCEPTANCE

Policy decisions and future review of the program are facilitated where the long-range program is carefully and succinctly documented. Whether or not the program is published, certain material should be preserved for future reference—copies of all factual tables and reports, copies of all analyses and reports prepared by the superintendent or his staff or the educational consultant, copies of all recommendations and supporting documents, and records of all school-board actions. Resolutions of the board of education duly entered in the minutes should show rejection, modification, acceptance, or approval of the superintendent's proposals, educational plans, and recommendations on the long-range program.

Formal adoption of a long-range school-building program does not commit a school board to proceed with all projects included. The facts which determine the need for school buildings or the desirability of individual solutions may not develop as anticipated in the forecasts. New facts or conditions may appear. Certain projects may be eliminated or modified before they are advanced. As already indicated, no project should be advanced without a careful review of all pertinent facts and factors.

The primary purpose served by a school-building program is to provide a broad basis for choice in selecting projects and sites for action. Without considering other possibilities, there is little basis for deciding upon a icular project at a given time.

ision should be made for the periodic review of the long-range and for its modification in terms of new or changed develop-

ments. There should be a program for the continuous collection of pertinent information for this purpose.

If the participatory approach suggested in Chapter 2 is followed, the chances of public acceptance of the long-range program are enhanced greatly. Staff and lay citizens involved in the studies and planning will have an excellent background for interpreting the program to various community groups.

The school board should adopt a definite program for developing public understanding of the long-range program and any modifications made in it from time to time. A clearly written, well-illustrated report summarizing the major facts and substantiating the plans or recommendations is a most valuable public relations device. Such a report provides background for publicity.

The public relations aspects of the long-range program are not very different from those of individual projects summarized in Chapter 16.

SUMMARY

In the preceding two chapters it was explained how the concept of need for school plant is developed, and the authority, leadership, and participation involved were discussed. This chapter has outlined the school-building program to provide a complete, adequate, and economical solution to each such need.

The planning of a sound long-range school-building program requires a thorough study of the community and its probable future educational program. It involves technical studies covering such matters as school-building standards, evaluation of existing plant, capacity and utilization of available facilities, and enrollment forecasts.

These data are essential for identifying and weighing all possible solutions, proposing a program of projects, arranging them in proper sequence, deciding upon the advancement of particular projects in the program, selecting and acquiring sites, and preparing educational specifications for a project.

The chapter summarizes the major policy decisions involved in a long-range-program approach. It provides an overview of the material contained in Part Two.

DISCUSSION PROBLEMS

1. Organize an office filing system for the documents and records of a school-building program.
2. Review several of the good-quality published reports of surveys of school-building requirements, and prepare an item analysis of the tasks to be performed by the personnel responsible for such studies and reports.
3. Demonstrate the contributions that various categories of school staff members may make to the following products: budget, maps, selection of equipment, school organization, departmental layouts, enrollment forecasts.

specific space needs such as storage or work areas, school-site selection, check list of needed facilities.

4. Describe a procedure for combining the school staff, the community leaders, and the school architect in a survey and analysis of the educational requirements of the community. Show bow this initial objective may lead to continuity of participation in the school-building program.

5. What are the advantages and disadvantages of conducting opinion polls during the preparation of a long-range building program?

6. What measures should be taken where a school-bond proposal is defeated at an election?

7. Describe in detail the features of a campus-type school that should be designed specifically for adult use—for example, parking areas, assembly conveniences, illumination for night use.

8. What assistance should the school superintendent seek in interpreting the school-building program to the public?

9. Contrast the economy of long-range planning with the economy of short-term or emergency planning. When is it better to modernize an existing substandard school plant?

10. What provision as to contingency planning must result from the probable error of estimate or the variability of underlying factors in a school-building program?

11. What educational-consultant services for long-range school building are available to school districts in your area?

12. What information is the owner expected to supply to the architect and what information is the architect expected to obtain by his own investigation?

RELATED READINGS

American Council on Education: *Things to Consider in Planning Educational Plants*, Washington, 1948.

Arnold, W. E.: "Techniques of School Building Surveys," *Review of Educational Research*, 8:418–423, October, 1938.

Cyr, Frank W., and Henry H. Linn: *Planning Rural Community School Buildings*, Bureau of Publications, Teachers College, Columbia University, New York, 1949.

Engelhardt, N. L., N. L. Engelhardt, Jr., and Stanton Leggett: *The Work of the Educational Consultant in School Building Planning*, New York, 1953.

Essert, Paul L., and Robert W. Howard: *Educational Planning by Neighborhoods*, Bureau of Publications, Teachers College, Columbia University, New York, 1952.

Juckett, Edwin A.: "A Community Studies Its School Plant Problems," *The American School and University*, 23:93–104, 1951.

Leu, D. J., and J. L. Forbes: *What Is Involved in Conducting a School Plant Survey?* Bureau of Research and Service, Michigan State University, East Lansing, Mich., 1956.

Morphet, Edgar L.: "How to Conduct a School Survey," *School Executive*, 67:11–14, April, 1948.

New York State Commission on School Buildings: *Doorway to Better Schools,* Albany, N.Y., 1953.

Red, David D.: "How to Get Ready to Build," *International Journal of Religions,* 34:8, April, 1958.

Sears, Jesse B.: "School Surveys," *Encyclopedia of Educational Research,* The Macmillan Company, New York, pp. 1126–1133, 1950.

Sellew, Roland W., and Carleton B. Ryder: "The Preplanning Survey: A New Approach to School Design," *American School Board Journal,* 127:41–42, September, 1953.

Sumption, M. R.: "Self-survey for Developing a School Building Program," *American School Board Journal,* 121:39–40, July, 1950.

Texas Education Agency: *Programming School Needs,* Austin, Tex., 1952.

Theisen, W. W.: "Long Range Planning for School Plant," *Nation's Schools,* 58:64–67, July, 1956.

Whitehead, W. A.: "Educational Consultant Services in Planning School Buildings," *Educational Research Bulletin,* vol. 26, 1947.

——— and Richard L. Featherstone: "School Building Survey Techniques," *The American School and University,* 20:102–108, 1948.

Wilson, William K.: *Long-range Planning of School Plants: What the School Committee Should Know,* New England School Development Council, Cambridge, Mass., 1947.

Periodicals, featuring school plant and equipment:

American School Board Journal
Nation's Schools
School Executive
The American School and University (annual)
Architectural Forum
Architectural Record
Progressive Architecture

CHAPTER 4

Advancement of the School-building Project

Once a decision is reached to advance one or more high-priority projects in a school-building program, there are a great many specific policies to be settled. Each in turn involves numerous questions that require careful investigation. Although this chapter will center attention upon the major policy decisions of the board of education, the purpose also will be to give the school superintendent a concise overview of the basic questions upon which he must be prepared to make recommendations. He can use the outline in orienting his school board in regard to their key functions in advancing the project. He can use it to organize his own work and that of his staff. A frame of reference is provided for the detailed administration problems and tasks to be covered in Chapters 11 through 20.

CONTROLLING DECISIONS IN PROJECT ADVANCEMENT

At the following stages in advancing a project the board of education exercises control over the whole process by its authorizations, approvals, or other actions. Sometimes state laws require action by some state agency or other local governmental agency at various stages. The order of control decisions may vary, depending upon legal requirements and local circumstances. For example, the site may be acquired as part of the long-range program before any other steps are taken.

CHECK LIST OF SCHOOL-BOARD POINTS OF CONTROL

1. Approve the scope of project and educational specifications
2. Make provision for legal counsel
3. Approve the capital-improvement budget and financial plan
4. Authorize a bond election or other means of financing
5. Authorize a bond issue
6. Approve procedures for selecting architect and other specialists
7. Engage an architect and other specialist personnel
8. Establish procedure for site selection
9. Approve and purchase a site
10. Approve public relations program for project
11. Request approval of other agencies, if legally necessary
12. Approve plans for staff relationships during planning and construction
13. Approve preliminary drawings
14. Approve final plans and specifications, including method of receiving bids
15. Advertise for bids
16. Let construction contracts and provide protection for the school system
17. Provide for supervision and inspection of construction
18. Approve procedures for selecting furniture and equipment
19. Authorize purchase of furniture and equipment
20. Accept the building and other work
21. Approve payments
22. Approve policies governing occupancy and use

The members of the board of education should avoid getting involved in the administrative or technical details of school building. Often one or more members of the board may possess unusual experience with large-scale institutional planning and construction. These individuals should feel free to offer the maximum contribution to the school superintendent and his staff within the framework here considered. However, school-board members sometimes get themselves so involved in a building program that they neglect their personal affairs, interfere with the work of the school superintendent, and begin to lose interest in the school-board work prematurely. This situation ought never to occur with proper management. At most a school-building program should require of the school board two meetings per month. The school board is legally bound to take all its actions as a corporate whole. It should deal only with policy decisions and authorizations, based upon the recommendations of its school superintendent.

The school administrator in turn should keep the school board completely informed at all steps, supplementing the technical reports and discussion with opportunities for first-hand observation covering both pertinent aspects of the local school plant and noteworthy building plans of other school systems which have solved similar problems. The board

members should be encouraged to ask penetrating questions, to review all proposals most critically, to discuss them thoroughly, and to seek further evidence to support solutions proposed. The more critically all recommendations are considered, the better will be the final decisions.

In making the critical initial decisions the school board will need a great deal of information on enrollments, existing facilities, possible solutions, long-range trends, school program and services, standards for school facilities, and all other factors treated in Part Two. In order to obtain this background material the board should provide the school superintendent with the technical assistance required to make the studies outlined in the next chapter. The school board should authorize the employment of necessary specialist personnel, approve the procedures to be followed in their selection, and approve their appointments. Having done so, it should expect from its chief school administrator carefully documented proposals and recommendations.

SCOPE AND EDUCATIONAL SPECIFICATIONS

Before most other actions can be undertaken, the board of education must approve the scope and the educational specifications of the project. This involves such decisions as:

1. Where should be the general location of the facility?
2. How many pupils are to be accommodated?
3. How are the pupils to be organized (grades, combination of grades, future changes)?
4. What curricula or services are to be provided—now and in the future?
5. What future changes in the use of the facility should be considered in its planning?
6. What community use of the facilities is contemplated?
7. What specific spaces are to be provided in the facility?
8. How flexible are they for multiple use or alternate future use?
9. What spaces may have to be added to the facility at some future time?
10. Should an educational consultant be employed for this work?

It is optional in determining the scope of a project as to how detailed a program of requirements will be prepared. The problem of defining the general scope of a project is presented in Chapter 10, and Chapter 12 is devoted to the problems of defining the detailed educational specifications for a project. Initially, however, the major decisions have to do with space standards, plant utilization, and scope of school activities; in other words, the type of school wanted, the population to be served, the specific facilities for the curriculum, and the various services to be

provided—all quite specific items affecting the lives and interests of many persons.

LEGAL CONSIDERATIONS

After the school board has approved the general scope of a project and the educational specifications for it, many fundamental legal questions will arise such as:

1. How may a school board legally acquire title to site?
2. What legal liabilities may be incurred in connection with site acquisition?
3. What laws or local zoning ordinances must be considered?
4. How can the board protect its interests in contracts?
5. What authorizations are approved and required? At what stages?
6. What are taxing and borrowing powers of the board relative to capital outlays?
7. What methods of financing capital outlays are permitted by law?
8. What restrictions or methods of financing are imposed by law?
9. How should the board proceed in handling bids and contracts for construction?
10. How should the board safeguard funds and protect the school district?
11. What legal services should be provided?
12. What is a reasonable fee for such services?

A school board's power to make decisions on most matters relating to school facilities is circumscribed by law. It should be sure of its power to act, what steps should be taken to make acts legal, and what restrictions, if any, are placed upon its powers relative to such matters as the sale and acquisition of property, entering into contracts, taxing and borrowing, bond issues, reserve funds, use of balances, site acquisition, advertising for bids, processing bids, and safeguarding the interests of the school system. Before any actions are taken on matters relating to a school-building project, the school board should provide for legal counsel. The specific legal problems and legal services required in advancing a project are covered in Chapter 13.

Most of the major decisions involve substantial obligations and possible liabilities for the local unit. The school board, with the aid of its administrative and legal staff, should anticipate the possible legal difficulties which might arise and take steps to avoid them.

Among the decisions which should be studied and considered most carefully before final action are those on contracts, final acceptances, and final payments. To assure value for money expended, the school board should take every precaution to guarantee title to land, to assure continued

use of the land for school purposes, and to avoid liabilities or law suits arising from ownership or use. It should protect the school system through bid and construction bonds, through inspection to assure compliance with specifications, and through insurance to avoid the risks of loss or liability. Funds for the project should be properly safeguarded or protected. Every precaution should be taken to avoid negligence and injuries during site development and construction. Compliance with local building codes and zoning ordinances and with state laws relative to proper authorizations and approvals, notices, referenda, advertising, and other legal requirements should be assured.

Many problems arise in providing necessary legal services—the work to be done, the method in providing the service, the method of paying for it, reasonable cost, and the like. These also are discussed in Chapter 13.

BUDGET AND FISCAL PROCEDURES

Except for the law itself, probably no other factor has as much influence upon subsequent decisions as the budget and the financial plan. Among the most serious finance questions which will arise are the following:

1. What will the project probably cost?
2. How accurate are the cost estimates?
3. How can the reasonableness of costs be judged?
4. What factors have to be weighed in considering costs?
5. Is the budget inclusive of all costs which can be anticipated?
6. Are budget estimates sufficient for the various categories of cost?
7. Have all probable sources of revenue been included?
8. Can the community afford the cost?
9. How can economy be attained?
10. What is the best method of finance?
11. What governs the proper choice of finance plan?
12. What can be done to reduce the cost of finance?
13. What business procedures should be adopted in financing a project?

It is the task of the board, with the assistance of the school superintendent and other specialists, before its approval to make certain that no unforeseen omissions occur in the capital-improvement budget or financial plan. Even in states where the law provides for a separate, earmarked local tax for debt service, an inadequate building-project budget can develop into a serious drain on current operating expenses in future years. Among the items in the budget that could easily be overlooked or underestimated are improvement of site, driveways, and grading, furniture and equipment, or specialist fees.

The lowest cost for original construction may cast a heavy burden on the annual school budgets of later years in the way of costly operation, repairs, maintenance, insurance, and similar expense items technically chargeable to current expenses but actually having no educational output. Such problems are discussed in Chapter 14.

Thus the decisions made on the project budget and the finance plan not only have serious implications for the kind of project provided and its future costs but also may seriously restrict the ability of the school system to maintain and improve the quality of its instructional operations. While considering the capital budget, the school board should inquire into its probable effects upon the current operating budget in terms of added staff and related expenditures. It should also study the probable effect of long-term borrowing for the project upon future tax rates. The efficiency and economy achieved in school-building projects are not necessarily demonstrated by low unit costs. The achievement of sound economy in the decisions depends upon a great many other factors, as is shown in Chapter 18.

The choice of the proper method of finance for a given locality presents one of the greatest challenges to the school board. It is easy to decide that all school-facility financing will be done with bonds issued for the longest period permitted by law. Yet such a decision may greatly handicap a school system operating under a debt limit. It may unduly inflate costs and may cause sharp fluctuation in local property-tax rates in the future. The right choice of financial plan depends upon such factors as the volume of construction over a period of years, past indebtedness, the *dovetailing of old and new borrowings, stability in tax rates,* debt *limits,* debt leeway, and many others. These are analyzed in Chapter 15.

The attainment of the utmost economy in borrowing depends to a considerable extent upon the actions of the school board, as explained in the chapters on finance. Much can be done to improve the borrowing power of the local unit. The employment of a competent bond attorney and the procedures followed in marketing bonds should be given the close attention of the school authorities.

It is frequently assumed that the long-run outlook for the nation's economy is inflationary and, therefore, borrowing is a wise policy to follow. This is true within limits. It does not justify exhausting the legal borrowing power of the locality for long periods when capital needs have to be met. It does not justify using funds to pay interest which could be used to provide facilities or a more satisfactory program. It does not condone spending beyond ability simply because it is easy to borrow money.

After it has approved the budget and the finance plan, the school board must determine policy upon a number of related matters: the

deposit and custody of funds, the investment of funds, how payments are to be authorized, accounting procedures, reports, and other aspects of business procedures connected with the project, as outlined in the chapters on finance.

SITE PROBLEMS AND POLICIES

Several questions have to be answered before a decision can be made to acquire a particular site. Among some of the most crucial are these:

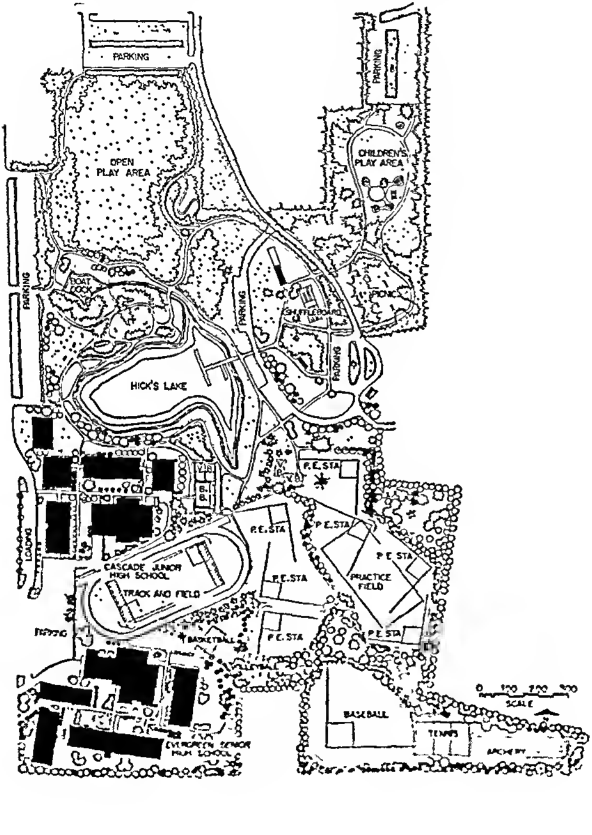
1. Is the evidence convincing on the long-range need for a school facility in the general area?
2. What criteria should govern the selection of a satisfactory site?
3. What considerations other than original purchase price should be weighed?
4. How can sites be acquired at the lowest possible cost?
5. Should options be secured? How?
6. How can site affect the costs of construction?
7. What are the best procedures to follow in finding suitable sites?
8. When is it advisable to acquire certain sites long in advance of actual construction?
9. What technical assistance is required in site selection?
10. What precautions should be taken before making the final decision to acquire a site?

The selection of the site has far-reaching effects upon construction costs, future utilization of the facility, and the expansibility of the facility to meet future needs. Delay in acquiring suitable sites not only may result in higher costs for land but also may mean extra costs and delays in purchasing and removing structures.

Long before it begins to look for a school site, the school board should agree upon the criteria to be used in the selection, the procedures to be followed in evaluating possible sites, the procedures for making the final selection, and the method of acquiring title. Having determined these guiding policies, it can leave much of the detail work to staff. However, it should make provision for the necessary technical assistance—architectural, engineering, and appraisal of reasonable market valuation. Such problems are discussed in Chapter 11.

Extreme caution should be exercised in regard to costs. Original cost has to be evaluated relative to the costs of development and the cost of building on the site. All possible ways of reducing costs should be explored. Both Chapter 11 and Chapter 18 should be consulted in this connection.

Fig. 4·1. Site layout accommodating two schools with areas used jointly. Cascade Junior and Evergreen Senior High Schools, Seattle, Washington. Stienhart-Theriault-Anderson, Architects; Wallace M. Ruff, Landscape Architect. (*Highline Public Schools.*)



PUBLIC RELATIONS

The school board is representing the people in making its decisions. Unless these decisions meet with general public approval or acceptance, the project may be delayed or resulting unfavorable public attitudes may handicap future projects or current operations. Among the essential matters to be decided are these:

1. What public relations problems can be anticipated from the selection of a particular site or a particular project?
2. At what stages in advancing the project is it most necessary to provide full information for the public?
3. In what ways can the project itself contribute to its own public relations?
4. How should the school authorities proceed in identifying potential sources of opposition or support?
5. What mistakes should be avoided in handling the public relations problems arising out of a project?
6. Who should plan the public relations program?
7. Who should participate in it?
8. What should the school board consider before approving the public relations program?
9. Has the program contained adequate provision for preparing the voters for referenda?

As the foregoing questions imply, the public relations aspects of a project should be studied and planned as thoroughly as the legal and financial aspects. Indeed the latter are most closely related to the public relations program. Chapter 16 is devoted to these problems. However, certain other aspects of the program, such as naming the school and dedicating the building, have good or bad public relations implications depending upon how well they are planned and executed, as is shown in Chapter 20.

ARCHITECTURAL-ENGINEERING SERVICES

The achievement of a satisfactory, flexible, adaptable, efficient, and economical facility depends to a considerable degree upon the technical competence of the architect and the various engineers upon whom he must depend. The personality and executive ability of the architect will govern the time schedule and determine the cooperation with school staff in design, the dealings with contractors, the public relations, and other equally important elements in getting a good job done economically without unnecessary delays.

Among problems which will arise in selecting and dealing with an architect are the following:

1. What services can be expected from an architectural firm?
2. What are the qualifications of a good architect?
3. How should the board proceed in selecting an architect?
4. What are the relative responsibilities of the architect, the school staff, and other technical personnel?
5. How can the school board judge the work of the architect?
6. What should the school board know before approving preliminary plans? Final working drawings and specifications?
7. What can be expected of an architect during construction?
8. How should the architect be paid?
9. What constitutes a reasonable expenditure for architectural services?
10. What records or information should the architect supply on completion of a project?

As discussed more fully in Chapter 17, the board of education makes an important decision when it selects the school architect. The school superintendent may be invited to draw up for the school board's reference a schedule of functions normally performed by an architect's office. The list would include such items as preliminary plans, working drawings and specifications, supervising the taking of bids, inspection and supervision of construction, and items directly related to the project under consideration.[1] An interesting supplement to such a list would be the work excluded from the architect's contract.

The architectural firm is normally expected to

1. Secure written approval of working drawings and specifications from the board of education and from government agencies as required by law.
2. Prepare advertisements for bids upon instructions from the board of education as to whether they prefer to have lump sum bids or segregated bids submitted.
3. Submit technical advice regarding bids; investigate the responsibility of contractors as necessary; and generally assist the board of education in reviewing the bids and in arriving at an award.
4. Effect and administer forms of contract, the posting of necessary bonds including bid bonds and contract performance bonds, and the time schedules for various completion stages of the building.
5. Approve selection of a supervisor or clerk-of-the-works to supplement the supervisory services of the architect and to provide continual personal supervision of construction during critical stages of building.

[1] *American School Buildings*, Twenty-seventh Yearbook of the American Association of School Administrators, Washington, 1949, chap. 8.

6. Act as moderator between the board of education and contractor in case of disputes or disagreements as the construction proceeds, and among contractors to avoid delay of construction.

7. Approve and certify all payments to contractors and subcontractors.

8. Inspect the buildings on completion and certify to the board of education that all bills, liens, and other obligations have been completed.

9. Interpret the school building to the public; instruct operating personnel on all mechanical services; and provide for the board of education a schedule of adequate maintenance.

What other services may the school district expect from a school architect's office in a large-scale project such as the average school plant? Few board members will have had much personal experience with enterprises of such magnitude. One considers the architect a designer and engineer, an artist and planner, but he also must be an administrator and coordinator, a legal and financial expert, a supervisor and safety engineer. He should be adept at public relations and a shrewd business executive both in managing his own office and the affairs of the district which employs him. He is expected to work for the district with a high sense of professional integrity and devotion.

How should school authorities go about choosing an architect? Obviously an architect should not be chosen solely because of residence or friendship with a school-board member or his sales approach. The following counsel has been offered by the New York State Education Department:[2]

> Architecture is a profession and employment should be on a professional basis, with due regard to loyalty, integrity, competency, office organization, personality and experience. Board members and school staff personnel should visit school buildings erected in recent years. The Division of School Buildings and Grounds (New York State) can give assistance in locating good school structures for inspection. In visiting buildings, there should be no expectation that one will be found to meet exactly present needs. New developments in school planning keep pace with developments in other fields. What may have been an excellent plan some years ago probably would not meet present-day thoughts of educators or architects.
>
> When visiting buildings, questions should be asked of board members, superintendent, principal, teachers and custodians:
>
> Is the building satisfactory?
>
> What faults have been found?
>
> How did final costs compare with original estimates?
>
> Did the architect show willingness to consider suggestions and did he follow adopted suggestions successfully?

[2] *School Building Projects—A Guide to Administrative Procedures*, State Education Department, University of the State of New York, Albany, N.Y., 1954, pp. 9–10.

Does the structure allow for efficient and economical operation and maintenance?

Was the architect professional, ethical and businesslike in his relations with the school board, administrators, contractors and material men?

Does he have the qualities of leadership and personality required for getting things done satisfactorily and on time?

As a result of visits to other buildings, it may be possible to make a tentative selection or, if not, the number of architects to be considered may be limited to three or four. The board should then consult with the one or more under consideration. Ample time should be allowed for conference with each architect and there should be full opportunity for him to explain the services of his office and to show some of his work. It is not wise to have more than one architect appear for an interview at the same meeting.

A fundamental decision on architectural service is made at the point where the school board votes approval of the preliminary plans. The best possible solution must be achieved at this stage, since changes made later will cause delays and involve added expense. If the school board has made provisions for close cooperation between the architect and the school staff in this work, the outcome is apt to be better than it otherwise would be. Preliminary plans and outline specifications should be thoroughly studied by the staff and its specialists (refer to Chapter 17).

The final specifications and working drawings constitute a business document that will be an important factor in securing favorable bids and avoiding extra costs. Before approving them, the board of education should be certain that they are concise, complete, clear, simple, and in accordance with contract. They should be reviewed for elements which would adversely affect bids, such as poor coordination between drawings and specifications, complicated, unusual, or difficult-to-follow drawings, ambiguous statements, unduly restrictive specifications, specifications which are out of date or not in tune with the current market, omissions, absence of alternatives where justified, uncommon construction methods or materials, and other items affecting costs. Such a review has to be done by someone familiar with construction materials, methods, and cost estimation. The board should provide for such a review. The responsibilities of the architect upon completion of the project will be discussed in Chapter 19.

FROM BIDS TO OCCUPANCY

After working drawings and specifications have been approved and before the facility is ready for occupancy, many other policy decisions will have to occur. Among these the following are selected for emphasis:

1. How can the school board obtain the most favorable bids for construction?

2. Should the low bidder be awarded the contract?

3. If not, what should determine the selection of the contractor?

4. What should the school board do to protect its interests during construction?

5. What constitutes a reasonable time schedule for the work?

6. How can delays be avoided?

7. What precautions should be taken before accepting the completed project and making final payment?

8. What policies should be adopted relative to the selection and purchase of equipment and furnishings?

9. What policies should be adopted relative to occupancy and use?

The timing of bids and the amount of competition which can be developed are important factors in determining construction costs. Both of these factors should be fully explored before advertising for bids. When bids are received, the decision on which one, if any, should be accepted depends not only upon price but also upon the reputation and financial position of the contractor, with particular attention to performance and extra-cost avoidance. These and other matters relative to construction are covered in Chapter 19.

During construction, provision has to be made for handling any enrollments in excess of the capacity of the available plant. Undue delays in completing construction may have serious effects upon the educational program and may disrupt operations when occupancy occurs at an inopportune time. On the other hand, premature occupancy of a project may prevent a school system from securing full compliance with contracts.

Thus provision has to be made for planning a satisfactory work schedule and attempting to adhere to it. Procedures for selecting, purchasing, and delivering equipment and furniture have to be agreed upon. Policies have to be adopted for the use and care of the facility and its contents before it is opened for occupancy. These elements are important in getting maximum utilization and return for the investment. Such problems are the subject of Chapter 20.

SUMMARY

The board of education should be advised in advance of the points of control where, as governing body of the school system, it must make policy decisions. Preparation for these decisions can only be made through foresight as to the kinds of questions which will arise.

The function here has been to supply a frame of reference for the technical matters to be treated in later chapters. In general the policy decisions which occur during advancement of a school-plant project to completion may be

grouped as follows: (1) scope and educational specifications, (2) legal considerations, (3) budget and fiscal procedures, (4) site problems and policies, (5) public relations, (6) architectural-engineering services, and (7) advancement from bids to occupancy.

DISCUSSION PROBLEMS

1. Would it be desirable for the local school board officially to adopt a permanent policy setting forth the organization and assignments of responsibility to ensure adequate coordination for an effective long-range plant program?

2. Describe a system of city school-district records that would encourage an orderly approach to and control of the local school-plant development program.

3. Enumerate the approvals by other government agencies that a school district in your state is required to have for conduct and completion of a school-building project.

4. Outline in detail the school-district election procedures of your state. Do the requirements enable any special control of the school-building program?

5. Outline the subjects on which the school architect may be expected to report to the board of education.

6. Discuss the advantages and disadvantages of establishing a planning committee to advise the superintendent of schools on the school-building program.

7. What elements of the school-building program should be recorded in the minutes of the board of education?

8. Outline and explain some of the groundwork a school administrator should develop in order to assure a defensible business program for school-plant improvement.

9. Discuss the ways and means by which a school board can provide for adequate debt leeway in future years and also improve the tax base for future school building.

10. What obligation does the school district have to assist the architect in producing his plans and specifications expeditiously and in keeping the building program on time schedule?

RELATED READINGS

Alexander, Robert E.: "The Planning Process behind the Blueprint," *The American School and University*, 20:202–215, 1948.

American Association of School Administrators: *School Boards in Action*, Twenty-fourth Yearbook, Washington, 1946.

Bursch, Charles, and John Reid: *You Want to Build a School?* Reinhold Publishing Corporation, New York, 1947.

California State Department of Education, Division of Schoolhouse Planning: *Basic Planning Procedures*, Form K-10, Sacramento, Calif., 1948.

Carpenter, W. W., and others: *Schoolhouse Planning and Construction*, No. 5, Missouri State Department of Education, Jefferson City, Mo., 1946.

Church, Harold: "Planning the School Building Program," *American School Board Journal*, 113:39–41, December, 1946.

Connecticut State Department of Education: *Public School Building Guide Including Standards for Approval*, Hartford, Conn., 1950.

Davis, Jesse B.: *Conducting a School Building Program: The Building Committee; the Consultant; the Architect*, New England School Development Council, Cambridge, Mass., 1947.

Elliot, Eugene: *A Guide for Planning School Buildings*, State Department of Instruction, Lansing, Mich., 1945.

Engelhardt, N. L.: "Planning School Building Programs," *American School Board Journal*, 114:32–37, January, 1947.

Engelhardt, N. L., Sr.: "Flow Charts of School Building Planning," *The American School and University*, 26:117–120, 1954.

Engelhardt, N. L., N. L. Engelhardt, Jr., and Stanton Leggett: *School Planning and Building Handbook*, F. W. Dodge Corporation, New York, 1956.

Essex, Don L.: *School Building Projects: A Guide to Administrative Procedures*, Division of School Buildings and Grounds, New York State Education Department, Albany, N.Y., 1955.

Fowler, Fred M.: "School Plant Services from the State Educational Agency," *School Executive*, 72:43–45, November, 1952.

Gregg, R. T.: "Steps in Planning School Building Programs," *American School Board Journal*, 116:23–25, February, 1948.

Herrick, John H., Ralph D. McLeary, Wilfred F. Clapp, and Walter F. Bogner: *From School Program to School Plant*, Henry Holt and Company, Inc., New York, 1956.

Marshall, J. E.: "Basic Steps in School Plant Planning," *The American School and University*, 19:202–206, 1947.

Oregon State Department of Public Instruction: *Manual for School Building Construction*, Superintendent of Public Instruction, Salem, Ore., 1947.

School Planning Conference, School Planning Laboratory, School of Education, Stanford University Press, Stanford, Calif., 1952.

Sexson, J. A.: "Functions of the School Administrator in Planning the School Plant," *The American School and University*, 16:14–17, 1944.

PART TWO

Program Recommendations

CHAPTER 5

Studies of School-facility Requirements

The school administrator as the community educational leader is responsible for defining the need for school facilities, securing agreement on the needs, recommending a long-range program to fulfill the needs, and proposing specific site and building projects in proper order to carry out the program. The superintendent in the exercise of this leadership must anticipate the unwise decisions which could be made. He must be prepared to prevent these and to bring about wise decisions on the matters covered in the preceding part.

In addition to resourcefulness in guiding group thinking the superintendent has to have the facts which will suggest possible solutions, identify sound solutions, and support them when they are presented. The gathering of the necessary data is the topic of this chapter, which will cover the kind of facts necessary, the area for which the facts should be gathered, the scope of studies to be undertaken, the possibilities of cooperation in such fact finding, the coordination of the research activity, and the evaluation and proper use of the data obtained.

ESSENTIAL DATA

The types of data essential for making recommendations on school facilities include data basic to developing appropriate community standards for determining needs, evaluating available facilities in terms of these standards, making maximum use of such facilities not only at a given

time but also in the long range, estimating immediate and future enrollments, planning long-range extensions of plant, selecting and developing sites, selecting and defining particular projects for advancement, and preparing educational specifications for such projects.

In order that the administrator may see the data-gathering process as a whole there is summarized below an outline of the kinds of studies which are required, together with questions to be answered, methods of securing the facts, and sources of data. This outline can be used as the basis for conducting a preliminary study of requirements.

The first three types of studies relating to the community, the community program for education, recreation, and culture, and school organization and program requirements are designed to provide background data for other studies and guides for long-range-program planning.

The next three types of studies relating to evaluating existing facilities, projecting school enrollments, and obtaining suitable school sites are often classified as technical studies. They make it possible to translate needs as determined by standards into a school-building program.

The last group of studies relates to the actual process of planning a long-range program. Since financial ability and resources often are involved in program planning, finance studies are included under this heading. The financial problems will be discussed in more detail in Part Three.

CHECK LIST OF STUDIES

COMMUNITY BACKGROUND AND SCHOOL-FACILITY STANDARDS

Nature of the community

A. Questions

1. What kind of a community is it (urban or rural, etc.)?
2. How has the community advanced through immigrations, annexations, consolidations, land improvements, trade, industrialization?
3. What is the general distribution of population in the area?
4. What are the social and political structures of the community (city planning, suburbanization movements, fiscal independence of the school district, overlapping municipal agencies)?
5. What is the degree of isolation from other metropolitan centers?
6. What geographic barriers exist, such as rivers, superhighways, lakes, or mountains?
7. What is the potential land usage? The degree of housing saturation, i.e., per cent of land available for improvement with one-family dwellings up to 80 per cent maximum?
8. What are the housing trends (directions and amount of change in dwelling units, demolitions, conversions, vacancies, and especially new dwelling units)?

9. What are the apartment-house policies as to family size and children admitted?
10. What is the pattern of home ownership and rentals?
11. What are the levels of income and the assessed valuation per capita (comparative)?
12. What is the general employment situation—proportions and types?
13. What statistical information is available concerning size of industries, manufacturing production, indices of commerce, utility services, lines of trade and commuting, retail-service territory, natural resources?
14. What is the economic dependency upon metropolitan centers?
15. What are dominant trends as to shifts in population, race distribution, birth-rate trends, impact of new industries, and large-scale family housing or apartment development?
16. What is the effect of dominant trends in the surrounding area?
17. Is the community stable or liable to rapid change in any of its major factors?
18. What are the educational levels of the community?
19. What are the national origins of the population?
20. What do the ages of the population indicate (marriage trends and family size)?
21. What is the density of the population by neighborhoods?
22. What are the social characteristics of the community? What are the deep-rooted traditions, loyalties, racial distinctions, political preferences?
23. What has been the tempo of prior economic and cultural development and what may be deduced as to the readiness of the community for particular improvements that may be recommended?
24. How has the school system grown, stage by stage chronologically, in its scope of activities and organization?
25. What public petitions have been received as to school offerings and operation?
26. What legal controls may affect future growth (state regulation of the power of the community to use its ability; city charter provisions and city planning; municipal controls imposed on education; probable developments as to district consolidations or other boundary changes)?

B. Methods

1. Fact finding and analysis along lines established by sociologists and other investigators.
2. Tabulate U.S. Census data for school district, region, state, and nation on various factors. Study trends; make comparisons.
3. Prepare the following maps:
   a. Highways, physical features, contours
   b. Dwellings, showing new dwelling units (ten years)
   c. Zoning of developed land; land usage
   d. Trade and commerce; classification of industry; anticipated developments; rental levels; etc.
4. Prepare a written description of the school district.
5. Summarize the history of the community and its schools.

6. Study the impact of the surrounding region.
7. Make public relations contacts with
   a. Educational staff members
   b. Board of education
   c. Employees of local government
   d. Independent planning agencies
   e. Businessmen and their associations
   f. Cross section of the public
8. Conduct a public-attitude survey.

C. Sources of data
   1. United States Census—Population and Housing Census Tract Data
   2. Municipal agencies
   3. Highway department
   4. County health department
   5. Covemment survey or research agencies
   6. Previous surveys on record
   7. Civic organizations
   8. Planning commissions
   9. State education department records
   10. Historic societies
   11. Library
   12. Business bureaus
   13. Utility companies
   14. Chamber of commerce
   15. Real estate offices
   16. Banks
   17. County agricultural agents

Community program of education, recreation, and culture

A. Questions
   1. What evidence is there of cultural enterprises (civic centers, churches, music centers, museums, recreational centers) and what is their distribution and degree of development?
   2. What are the community activities, youth organizations and agencies, adult societies, PTA, community-improvement associations?
   3. What community use is made of the school plant?
   4. Is the school used as a strategic center for community interests?
   5. Are there satisfactory junior college or regional university opportunities?
   6. What advanced technical training, both public and private, is available?
   7. To what extent are supplementary educational offerings patronized, such as music teachers, private nursery schools or kindergartens, private night schools, language and business-machine schools, courses offered by youth agencies, training courses offered by industry?
   8. What is the scope of childhood education exclusive of the public schools, such as farm living, religious classes held by churches, youth organizations for the respective age groups, wholesome social and recreational opportunities supplied by community agencies?

9. What formal education is provided by industry?
10. How extensive is the adult education program of the public schools?
11. What is the program of private and parochial schools—the attendance, organization, institutions, facilities, program?
12. What are the future plans of private and parochial schools? Will they build and keep pace with an increasing school population? Which grade levels do they prefer to emphasize? What is their present and proposed future plant capacity?
13. What are family intentions as to children receiving higher education?
14. What proportion of graduates have entered higher education? What proportion of youth on the school census enter higher education?
15. Are there demands for additional offerings to attract students to remain in high school until graduation?
16. What proportions of children on the school census have dropped out of school before graduation?
17. What is the view of local industry concerning the vocational importance of the public school program?
18. What are family intentions as to sending children to public or to private or parochial schools?
19. What probable increase may be expected in the holding power of the public schools?
20. Is there a demand for evening high school, part-time schools, or summer school? Are special schools required for the handicapped?
21. How much lay participation has occurred in school planning?
22. What are the views of the board of education as to the desired scope and policy of the educational program?
23. Does the community have any form of youth council?
24. What is the community program for recreation?
25. To what extent will the school district be chosen as the agency of local government for the purpose of supplying desired community services?
26. What provisions are required for spectators at school functions, such as athletics contests, drama or musical entertainment, and graduation or other ceremonies?
27. What major views are expressed by community leaders such as bankers, merchants, industrialists, real estate agents, editors, school administrators, clergymen, professional men; and also by parents, pupils, custodians, labor leaders, school staff, and school-board members?
28. Does the community have a definite improvement program? How are the schools related to this improvement plan?

B. Methods

1. Inventory or map the appropriate facilities, such as parks, auditoriums, stadiums, community centers, libraries, private and parochial schools (show size, number, location, and utilization).
2. Evaluate major trends. Relate the community's basic aspirations and program for education to that which is common to the region, state, nation, and similar communities—the trends and mandates of the larger society.

3. Statement of the educational aims of the school system in sufficient detail to suggest guides.
4. Reconcile attendance boundaries of public with private or parochial schools.
5. Conduct a public-opinion survey (sampling).
6. Infer the community expectancy and pressures from past reactions to change in the school program, experimental reports, views expressed at public meetings, frequent consultation with school authorities and others.
7. Survey public views on education and unmet needs as to
   a. Scope of education: adult, vocational, preprimary
   b. Reduction of juvenile delinquency; other desired educational processes
   c. Services the modern school should render, as school transportation, cafeteria, physical education, library, summer-quarter programs, guidance, youth centers
   d. What the public say they want children to learn, such as teamwork, thoughtfulness, consideration, leadership, character, personality, dependability, good taste, loyalty
8. Describe the long-range community purposes. (Caution: School estimates must be conservative in respect to the thinking of representative lay committees.)

C. Source of data
   1. City and county departments
   2. City planning agencies
   3. City maps showing institutions
   4. Civic and church leaders
   5. Previous survey reports
   6. Citizens' advisory committee
   7. Parent-Teachers Association
   8. Youth council
   9. Youth agencies
   10. Private and parochial school authorities
   11. College officials
   12. Public school guidance records
   13. Welfare organizations
   14. Chamber of commerce
   15. Civic-improvement associations

School organization and program

A. Questions
   1. What are considered to be the general characteristics of a good school program? (Refer to state regulations and basic philosophy of the schools.)
   2. What home-school relationships and ties are established?
   3. What is done to promote teamwork, initiative, appreciation, voluntary participation, consideration for others, and preparation for the occupations of adulthood?

4. What is to be the policy concerning attendance boundaries for the various building units?
5. What analysis can be made of the child population (age-grade, IQ's, wealth, major employment trends, home background)?
6. If the school is held responsible for meeting the educational needs of all youth under nineteen years of age, what groups are not now adequately accommodated?
7. What is to be the functional vertical organization of the school system: K-8-4, K-6-3-3, K-6-6, K-6-4-4, etc.?
8. Which grades are to be departmentalized and to what extent?
9. What administration pattern is followed: line and staff, etc.?
10. What, if any, major changes will occur in the organization?
11. Will there be a summer-quarter program?
12. What is to be the policy on articulation with higher education? On termination, promotion, graduation?
13. Are any major extensions of the curriculum beyond present departments and grade levels anticipated?
14. What ratio of staffing to enrollment is planned? What will be the number and type of teacher stations required?
15. What number and size of pupil groups must be planned for?
16. Is the typical class taught with a differentiated curriculum?
17. What typical classes will be necessary?
18. What is the future schedule of classes and activities? What are the time allotments and the planned supervision of pupils?
19. Will facilities be required for nursery school or preprimary levels?
20. Will the school system offer junior college education or other offerings extending beyond high school completion to employment?
21. Will there be evening school for employed youth?
22. Will school services operate around the clock and around the calendar?
23. What provisions are needed for adult education, community programs, administrative services, parking, spectators?
24. What specific services must be supplied and what is the estimated load (cafeteria, health, remedial instruction, coaching of student activities, library, transportation, guidance, home teaching)?
25. How do small groups spend their day with respect to projects, displays, library reference, demonstrations, recitations, free group activities, use of out of doors, nature study, art, music, dance, and play?
26. In general what is the relation of formal studies to informal activities? What use is planned of the auditorium, library, playgrounds?
27. What specific spaces are needed for bench work? Laboratories? Large formal assemblies? Exhibits? Storage? Dramatics? Band and orchestra? Athletics program? Vocational shops? Television?
28. Is there to be a shift of emphasis in the school activities and will provision for new types of activities be wanted? Does the plan meet community needs?

B. Methods

1. Survey all factors that determine a long-range plan.
2. Study departmental needs, including enrollment and offerings.
3. Study the utilization of the school plant.
4. Have planning sessions with the school staff; encourage creative thinking regarding the type of learning environment that would promote educational aims and improve teaching methods.
5. Formulate policies and make decisions on specific phases of the educational program..
6. Determine the functional program of the school system as to
   a. Administrative policies covering the school-system organization
   b. Philosophy and purposes of the school staff
   c. Relationship of building units to the total program
   d. Types of special plant facilities for the various instructional departments
   e. Space per pupil station necessary for efficient teaching
   f. Allowance for major change and possible expansion in the scope of the school program
   g. Suggested multiple use of spaces
   h Various room capacities required for the educational program
7. Study the relation of the youth population census to school enrollments.
8. Prepare the general statement of requirements, including use of various building units and school sites.
9. Prepare educational specifications or performance goals for the school architect.

C. Sources of data

1. Educational staff studies
2. Individual teacher requests
3. Existing curriculum
4. Existing school schedules
5. State regulations and syllabuses
6. Statements of the philosophy and aims of the school system
7. Student records

TECHNICAL STUDIES

Evaluation of existing facilities including capacity and utilization

A. Questions

1. What are the present ages, types, and uses of existing plant? Of additions thereto?
2. Is the basic structure of the buildings sound and what is their probable useful life?
3. What is the type of construction and plan of each building?
4. How do the buildings compare in all their physical and educational features with other schools throughout the country?
5. How well is the existing plant adapted to the educational program that it is desired to house and accommodate?

6. In what respects are the buildings substandard?
7. What rehabilitation or modernization would be required to make them healthful, safe, and educationally efficient?
8. What major additions are required to make the school plant complete?
9. If improvements are required, which are in most urgent need of attention?
10. What is the operating capacity of the existing school plant for the proposed use? How will proposed additions affect that capacity?
11. Is there underutilization or overcrowding?
12. In view of the school-population changes, what changes in the utilization of the present facilities are possible in the future?
13. Does the planned utilization justify auditorium, gymnasium, cafeteria, various types of offices, library, laboratories, and similar facilities?
14. Are the buildings efficient for operation and maintenance?

B. Methods
1. Agree upon acceptable minimum standards.
2. Inspect the plant and evaluate it with the aid of a school-plant score card.
3. Specify the modernization and rehabilitation requirements in detail and obtain informal cost estimates.
4. Having determined the desired purpose or use, compute the standard and operational capacity of the building units.
5. Study the utilization of the existing plant facilities as to rooms, pupil stations, and auxiliary facilities.
6. Recommend ways to improve utilization.
7. Recommend disposition of the unit.

C. Sources of data
1. Standards (National Council on Schoolhouse Construction and local school building codes)
2. School property records
3. Inspection reports
4. Sketch drawings of plot and floor plans
5. Consulting architect
6. Contractors or engineers

Enrollment estimation

A. Questions
1. What is the adequacy of the school district's size and the propriety of school-district boundary changes. What is the likelihood of future changes in the district boundaries?
2. What is the probable effect of the local-resident live-birth trend? (Compare with regional, state, and national trends.)
3. What have been the population shifts within the school district and within the region?
4. What has been the trend in total school population and school-census enumeration? Has this been consistent for the preschool children?
5. How will occupational changes affect the school population?

6. What has been the record of the housing cycle? Where are peak enrollments likely to occur?
7. What is the marriage and family-size trend?
8. Where do maps of new dwelling units indicate that new concentrations of child population are likely to occur?
9. Is there institutionalized population?
10. What is the probable future "holding power" of the school?
11. How many pupils of each grade should be deducted for private and parochial school attendance in making census projections?
12. How many pupils should be added in order to accommodate the anticipated nonresident attendance?
13. Have the most efficient statistical methods been used in preparing enrollment projections and school-census projections? Are there any inconsistencies that require explanation? How reliable are the estimates?

B. Methods
1. Inventory all factors that could affect or cause marked changes in the population to be served.
2. Study the region in which the school district is located.
3. Analyze the shifts of population that have occurred among neighborhoods within the district.
4. Prepare maps of pupil residence.
5. Study nonpublic school attendance.
6 Study nonresident enrollment trends.
7. Estimate what part of the population projection will attend school.
8. Prepare a statistical projection of enrollment trends (five to ten years).
9. Prepare a statistical projection of school-census trends (five to ten years).
10. Analyze enrollment trends by buildings and by departments.
11. Estimate peak enrollments of school-attendance areas. Note contingency factors (as land usage) and their possible effects.

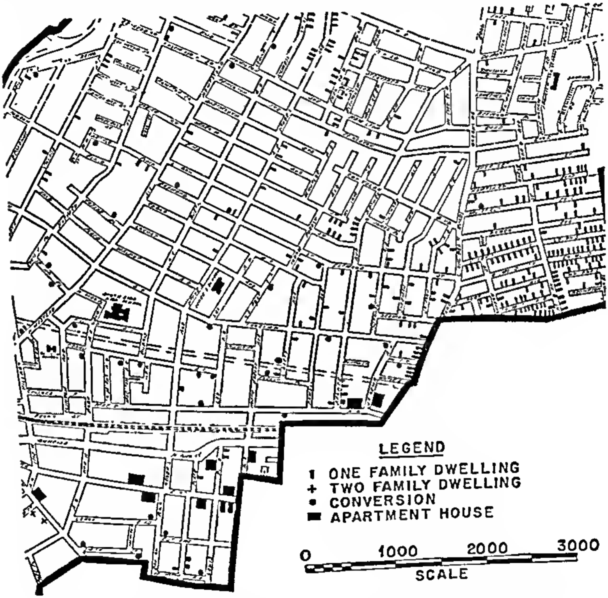
C. Sources of data
1. School census
2. Special school-building census
3 Enrollment records
4. Age-grade charts
5. Resident birth records (vital statistics)
6. Housing maps
7. Public utility records
8. U.S. Census
9. Survey of community factors
10. Nonresident enrollment records

School sites

A. Questions
1. What is the policy as to distance and/or time a child of a given grade level shall walk or travel to school?
2. What are the trends in child population by neighborhoods?
3. What is the school-system policy as to school transportation?
4. What usage of the present school sites is intended?

5. For what enrollments would these present school sites be adequate?
6. How should the school sites be located with respect to land usage, industry, highway traffic, social customs?
7. Is it desirable to construct additions to the present buildings?

Fig. 5-1. Increase of residential dwellings (since 1945) may appear as meaningful clusters on a map. (*Report of the Survey of School Building Requirements of the Union Free School District No. 21, Rockville Center, New York, Institute of Field Studies, Teachers College, Columbia University, New York*, 1950.)



8. What is the cost of land where new school sites may be needed?
9. Do proposed new site areas have access to power and light, water, sewage disposal, drainage facilities, fire protection, highways?
10. Does the school site serve a community function?
11. Does the school site have desirable cultural features?
12. Will the school district have a need for a campus-type development with the possibility of a community school, large secondary school, specialized building units, and so on?

6. What has been the record of the housing cycle? Where are peak enrollments likely to occur?
7. What is the marriage and family-size trend?
8. Where do maps of new dwelling units indicate that new concentrations of child population are likely to occur?
9. Is there institutionalized population?
10. What is the probable future "holding power" of the school?
11. How many pupils of each grade should be deducted for private and parochial school attendance in making census projections?
12. How many pupils should be added in order to accommodate the anticipated nonresident attendance?
13. Have the most efficient statistical methods been used in preparing enrollment projections and school-census projections? Are there any inconsistencies that require explanation? How reliable are the estimates?

B. Methods
1. Inventory all factors that could affect or cause marked changes in the population to be served.
2. Study the region in which the school district is located.
3. Analyze the shifts of population that have occurred among neighborhoods within the district.
4. Prepare maps of pupil residence.
5. Study nonpublic school attendance.
6. Study nonresident enrollment trends.
7. Estimate what part of the population projection will attend school.
8. Prepare a statistical projection of enrollment trends (five to ten years).
9. Prepare a statistical projection of school-census trends (five to ten years).
10. Analyze enrollment trends by buildings and by departments.
11. Estimate peak enrollments of school-attendance areas. Note contingency factors (as land usage) and their possible effects.

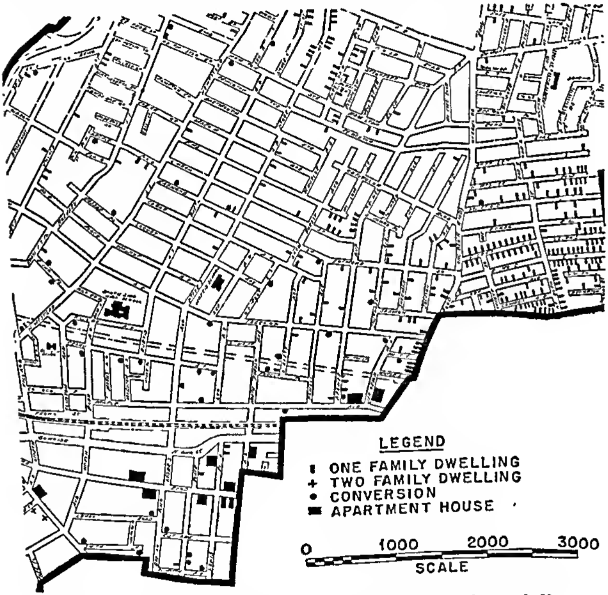
C. Sources of data
1. School census
2. Special school-building census
3. Enrollment records
4. Age-grade charts
5. Resident birth records (vital statistics)
6. Housing maps
7. Public utility records
8. U.S. Census
9. Survey of community factors
10. Nonresident enrollment records

School sites

A. Questions
1. What is the policy as to distance and/or time a child of a given grade level shall walk or travel to school?
2. What are the trends in child population by neighborhoods?
3. What is the school-system policy as to school transportation?
4. What usage of the present school sites is intended?

5. For what enrollments would these present school sites be adequate?
6. How should the school sites be located with respect to land usage, industry, highway traffic, social customs?
7. Is it desirable to construct additions to the present buildings?

Fig. 5-1. Increase of residential dwellings (since 1945) may appear as meaningful clusters on a map. (*Report of the Survey of School Building Requirements of the Union Free School District No. 21, Rockville Center, New York, Institute of Field Studies, Teachers College, Columbia University, New York*, 1950.)



8. What is the cost of land where new school sites may be needed?
9. Do proposed new site areas have access to power and light, water, sewage disposal, drainage facilities, fire protection, highways?
10. Does the school site serve a community function?
11. Does the school site have desirable cultural features?
12. Will the school district have a need for a campus-type development with the possibility of a community school, large secondary school, specialized building units, and so on?

B. Methods
1. Establish standards as to size of school sites in view of cost of land and need.
2. Evaluate existing school sites with a standard score card as to accessibility, environs, and educational usefulness.
3. Study housing trends, land utilization, and school population trends.
4. Decide upon maximum walking distances or travel time.
5. Determine the usage to be made of both existing sites and proposed new sites.
6. Investigate proposed city planning developments and major highway or other improvements.
7. Rate possible new sites with score card.

C. Sources of data
1. School records
2. Property records
3. Property-survey records
4. Special maps of highways and physical features, school transportation routes, pupil residence, distance to existing school sites, zoning and land usage, old and new housing

LONG-RANGE PLANS AND FINANCE

Plant development

A. Questions
1. What is the ultimate school plant to be? Is there a change in organization anticipated?
2. Will neighborhood or campus-type schools be developed?
3. What is the optimum size of school unit?
4. Have staff recommendations and educational specifications been clearly channeled? Are they accepted by the school board? Are they in terms understandable to the architect? Are they consistent?
5. Does the educational program require new structural types of buildings?
6. Which attendance areas need additional classrooms and other facilities?
7. For what capacity should new building units be designed?
8. How much leeway in buildings and sites should be provided for possible future expansion?
9. Shall immediate needs be met with changes in and/or additions to the present building units (and sites)?
10. What additional facilities besides class rooms do the present buildings require?
11. What is to be the long-term disposition of the present buildings?
12. What is to be the policy and plan of school transportation?
13. How can the successive stages in utilization of buildings be anticipated and planned for?
14. What compromises should be made to accommodate peak enrollments?
15. What emergency needs must be met at once?
16. What improvements can be made in the plan or layout of the various school sites?

17. Should new sites be acquired in anticipation of population increases or shifts or housing developments?
18. What rehabilitation is needed to preserve the school property?
19. Are temporary provisions required (as during construction)?
20. How can cost estimates and priorities be established?
21. How can public relations be planned to gain support for the proposals?
22. How can the money be raised? Investigate ways to avoid indebtedness.
23. Is a time schedule needed for the production of studies and plans?
24. What desired improvements in central control and progress records of the office responsible for the building program should be recommended?

B. Methods
1. Review laws applicable to the building program.
2. Determine the desired location of buildings.
3. Prepare program of requirements for improvement of existing plant and estimate costs.
4. Arrange the required modernization and rehabilitation of the present school plant in order of importance.
5. Propose transportation or other economical ways to gain maximum utilization.
6. Determine the facilities required to achieve a complete educational program.
7. Determine the additional plant needed to accommodate school population.
8. Arrange the planned steps in chronological order of action.
9. Suggest alternatives to meet problems arising from practical considerations.
10. Develop a public relations plan.
11. Budget the costs (including staffing, maintenance and transportation costs).
12. Establish control records for the school-building program.

C. Sources of data
1. State laws
2. Statement of educational program
3. Analysis of all preceding data
4. Maps of factors related to location of school units
5. Predicted school population
6. Proposed utilization of existing plant
7. Inventory of existing plant

Problems of Finance

A. Questions
1. What is the adequacy of the school district in terms of having enough pupils for the classes to be organized under the proposed curriculum, of the school district's ability to exceed the minimum foundation program set by the state, of capacity to maintain good administration, of the socioeconomic unity of the region, of fiscal independence, of wealth to support a minimum program, of economical transportation of pupils to the schools, and reasonable amount of flexibility of operation?

2. Is there any plan for the county unit or other intermediate unit to build the required schools?
3. What grants-in-aid, state, Federal, or other, are available?
4. Are there available building-reserve funds?
5. What legal power does the school district have to improve its tax base?
6. What measures of trade and productivity may be available for the area?
7. What is the discrepancy between current taxpaying ability and potential taxpaying capacity?
8. Is there nonresident ownership of major taxable valuations, or other special aspects of the tax situation?
9. What per cent of taxable wealth is the net indebtedness?
10. Following provisions of the law, how much bonding capacity remains for the school district?
11. What overlapping indebtedness is found with other municipal agencies?
12. What would be the best form of bond for the district to sell and how may interest costs be minimized?
13. What is the percentage relationship of annual debt service (and other capital expenditures) to the instructional budget? Does any encroachment occur?
14. What possible economies can be effected in the building program?
15. What is the trend of the cost-construction index?
16. How are the proposed new school sites to be financed?
17. Are funds currently available for necessary technical studies?
18. What has been the history of the community as to the disposition to vote school-finance proposals? When is the best time to have a school-bond election if one is required?

B. Methods

1. Obtain informal cost estimates on proposed renovation of existing plant.
2. Estimate cost of major improvements and additional school sites and building space (construction costs per cubic foot, per square foot, and per pupil station are helpful).
3. Compare valuations with regional trends.
4. Record the trend in school-district tax revenue, tax rates, and assessed valuation of taxable property. (Estimate other revenue sources.)
5. Project the estimated economic ability of the school district over the length of the proposed bond issue.
6. Chart relationship of amortization schedule of outstanding bond issues with possible new issues.
7. Estimate the borrowing capacity of the school district and produce evidence on the credit standing of the district.
8. Budget the financial support for the capital-improvement fund (from all sources).
9. Prepare material for publicity.

C. Sources of data

1. Services of a consultant architect in estimating the cost of proposed improvements and additions
2. School budget records

3. Services of bond attorney
4. District tax records
5. State laws
6. Schedule of outstanding indebtedness

DEFINING THE AREA TO BE STUDIED

The studies outlined in the preceding section have to be conducted either (1) upon the assumption of continuity of the existing local unit of school government without change or (2) upon the assumption that its boundaries should and will be changed in the future. Small-area and small-enrollment local units should proceed upon the basis of the latter assumption. If they will eventually serve surrounding small operating units, the large units should proceed upon the basis of the second assumption too. Some very large operating units may find it desirable to divide the district into subareas for purposes of conducting the studies.

Not many local school units are self-sufficient in education. The development of comprehensive, vocational, and technical high schools with varied offerings to meet individual needs, the growth of junior colleges and other advanced, specialized institutions for youth, the expansion of special classes for the handicapped, the extension of parent and adult education programs, and the growth of specialized services for all age groups, such as those in health, pupil personnel problems, psychology, curriculum making, testing, remedial instruction, and instructional improvement have changed the concept of a satisfactory local school unit. Those created to provide a rudimentary elementary education generally lack sufficient pupils or resources to produce a complete educational program. Those created to provide a college-entrance-type secondary school program for a small, select student body are seldom able to give an adequate secondary school program for all youth and adults. City school systems and other large local units often have to furnish specialized instruction and services for the surrounding suburbs or smaller units.

Local responsibility in studying and planning school-building programs generally is a cooperative responsibility shared by a group of school systems in an area. Any local unit that does not have sufficient pupils or resources within its own boundaries to provide a complete educational program should, if possible, plan its long-range school-building needs in terms of a geographic area which can ultimately provide them. The planning should be done in terms of such an area, even though district reorganization, the creation of cooperative boards for sharing services among smaller school districts, or the creation of a larger intermediate or service district may be necessary to attain that program.

Even among large systems that can offer complete educational pro-

grams, a certain amount of cooperative study and planning may be necessary. This need is most evident in urban and suburban districts. A suburban school or city school district sometimes erects a school which is more accessible to residents of a neighboring district than to many of its own residents. Cooperative planning and alteration of boundaries would in many instances lead to improved school location.

The opportunity for reorganizing local units to obtain an adequate secondary school-age population for school-building purposes (at least 1,200 pupils) should be investigated before obligations on long-term-building plans are incurred. Reorganization of rural regions has progressed rapidly in recent years by acceptable democratic processes; yet the majority of rural school districts would not and possibly could not meet this criterion.

City school systems have a different problem because of modern transportation and suburban living. As fast as city school-district boundaries have expanded, they seldom have kept pace with the school needs of the suburbs. Consequently suburban schools range from excellent to very poor. The direction of highways and traffic flow at the outskirts of cities often makes the maintenance of separate fringe local units unsupportable. Fiscal independence in many city school systems has been the enabling force that permits them realistically to include suburban child population in their planning at any given time.

The problem of adequate local-unit boundaries is dependent upon population trends and economic change of the surrounding region. Therefore an investigator usually has to gather facts on the whole larger region before getting down to the particulars of desirable or potential changes of local-school-system boundaries in an area.

SCOPE OF STUDIES

The ideal practice would be to have the necessary studies continuously carried on. However, this practice is not practical except in the very large school systems with a continuous school-building program. The scope of studies to be undertaken in most school systems will depend upon a number of considerations: whether a comprehensive survey has been completed; if so, when it was finished, how complete it was, and the extent to which it has been kept up to date; what data within the school system itself or from private or public agencies in the community are kept up to date and available; the extent of cooperation which can be obtained from other agencies in providing the facts not now available; the resources available for conducting studies; and the time available for completing the studies.

It is very important in defining the scope of studies to keep a balance

between school-facility studies as such and studies relating to current operations, with particular emphasis upon the quality of educational program. Without adequate data on all of the key factors affecting school quality, it is not possible to define essential school-building needs. As explained in Chapter 1, school-building need always is relative to a realistic appraisal of conditions.

Following is a brief summary of minimum predictive records that should be maintained in the office files of every school district:

Summary and analysis of the school census. Since most school districts do not have a complete school census for school-building purposes, it is recommended that they improve their census procedures to include, besides the age and school affiliation of children from birth to eighteen or twenty-one years of age, an enumeration of every dwelling unit. This special enumeration should include family structure by type of dwelling, migration facts by type of dwelling, and family plans for school attendance. Analysis of these data will disclose interesting facts concerning neighborhood trends of the school district.

Records of annual resident births. Where audited records from the state health department follow civil divisions other than school-district boundaries, it may be necessary to prorate for the school district or the area under study.

New residential-dwelling construction. Plotted on maps, this information helps in locating school sites, anticipating changes in population density, and making studies of land usage or saturation.

Enrollment records by buildings, departments, grade, and age. While these data are easily obtained, they often are not completely preserved. They should be tabulated annually.

Studies of private and parochial school enrollment. The authorities of nonpublic schools are as a rule quite cooperative in making available their attendance records and explaining their future plans. Often their records are not coterminous with the public school district, but nevertheless they are extremely important. The most common fault is neglect of school districts to keep their files of nonpublic school information up to date.

Enrollment density by residential sections of pupils attending public schools. Coding of the school-census pupil-record cards by areas or zones could replace the laborious construction of spot maps of pupil residence. Use of machine-card sorting in large cities would be productive in this connection.

U.S. Census and wider area comparisons. A file should be kept of general and special studies by the U.S. Census, the Office of Vital Statistics, and state agencies. Among the predictive data to be tabulated are population trends, population characteristics, housing trends, chil-

dren per household, types of employment, and economic development—keeping in mind a comparison of the school district with the wider market area of which it forms a part.

Community setting and total-population forecasts. This file will contain maps, data on land usage and transportation, zoning ordinances,

Fig. 5-2. Residence of pupils shown by spot map. (*Report of the Survey of School Building Requirements of the Union Free School District No. 21, Rockville Center, New York, Institute of Field Studies, Teachers College, Columbia University, New York*, 1950)

published business forecasts, information on economic and industrial trends, real estate trends, sociological factors, cultural and recreational developments, and community and school history. Total-population forecasts may be obtained from specialists in utility companies.

Studies of enrollment trends and holding power. Records should be kept for comparison of all surveys, studies of nonresident enrollment,

vocational expectancy of older youth, relation of births to school admission, attendance above compulsory age, and trends by departments of the school system.

Index of school-plant utilization. Bridging from enrollments to space requirements, an index of school-plant utilization based upon reliable measurements of plant capacity will warn the district where intensive studies should be started.

School-property records. These should contain historical data, such as acquisition, blueprints, original specifications, and plot plans, and also an up-to-date inventory of sites, special facilities, and capacity estimates.

Program and policies. While this is a broad category, it is necessary to interpret historical-trend data and current conditions. Among the items to be kept in the file are policies on admissions, class size, promotion, and graduation, master plans for school-plant development, proceedings of citizens committees, records of utilization programs or schedules, financial liabilities and assets of the district, pertinent reports of the school superintendent or other officials, applicable laws and building codes, and projections of curriculum needs.

COOPERATION WITH OTHER AGENCIES

The capital programs for schools and other local governmental functions can interfere with each other or supplement each other, depending upon the degree of cooperation and coordination that exists between the school administration and other community agencies. The timing of votes or other approvals of bond issues and the schedules of maturities for bond issues for various purposes, the maximum use and avoidance of duplication of public facilities, and the development of a balanced program of public works are but a few of the areas in which such cooperation is urgent.

Informal Cooperation. The machinery and methods of cooperation will vary with the local government structure, the presence or absence of planning bodies, the laws of the various states, and other factors. Yet in the absence of any legal machinery school authorities and their staffs, as responsible public agents, should take at least the following steps in studying and planning a school-building program:

1. Attempt to arrange an exchange of information between themselves and other governmental agencies serving the same area and population on anticipated capital needs and the timing of those needs, proposed bond issues, maturity schedules, and other fiscal facts.

2. Contact highway departments, health departments, recreation bodies, commerce departments, public-housing agencies, building departments, public-works departments, and any other local governmental or

private agency which might have information valuable in planning school facilities.

3. When there has been little or no community planning, broaden the school-building studies into a community survey with special attention to allocating responsibility and avoiding duplication in such areas as health, recreation, libraries, auditoriums, and welfare services.

4. Study local building codes that apply to schools and work for removal or modification of any provisions which interfere with functional and economical planning and construction of schools.

5. Strive for a satisfactory pooling rather than an overlapping or duplication of services which affect the cost of buildings and their operation.

6. Investigate the possibilities of acquiring tax-delinquent properties for school sites.

7. Try to work out the most economical means for securing reliable information for school-building planning. (Sometimes birth statistics, for example, are not reported by the areas most useful in school planning. It is much less expensive to add an extra code to the data already available in the health department than it is for the school board to do the whole job independently. The same is true where births are reported by place of birth rather than by place of residence of the mother.)

8. Initiate or support efforts to establish city, community, or regional planning agencies in local government.

Cooperation among local governments often can be implemented by nongovernmental agencies such as citizen research groups, civic organizations, a university governmental-research center, or a committee of leading citizens. Where the necessary cooperation cannot be obtained by direct contact, such agencies should be utilized. Among the items on which agreement among the agencies should be sought are these: What comprises predictive information? How can the geographic boundaries for studies be harmonized? How can the experience of workers concerning methods of processing the source data best be exchanged? In some cities there may be a society of statisticians which meets regularly. In other instances a local chamber of commerce takes the initiative in promoting coordination of data gathering. If no such agency exists and cooperation otherwise cannot be accomplished, school leaders should take the initiative in creating a citizen agency which will aid in bringing about the desired relationships between school government and other local government.

Cooperation with Planning Agencies. Where a locality has an official planning agency, the school board and its staff should work toward the following objectives:

1. A pooling of research and research staffs or an exchange of informa-

tion on such matters as population, boundaries, housing, public improvements (parks, playgrounds, recreational facilities, libraries, health facilities, schools, and other public buildings), highways and streets, lands owned by local government units, vacant lands, transportation facilities, zoning, mapping, and other factors affecting the utilization of, need for, and location of school buildings

2. Joint deliberation on the location, selection, and development of school sites, with the objective of making greater community use of school property and greater school use of other public property

3. Coordination of school planning with city planning and zoning, using the latter as a framework for the former

4. Representation for schools on the planning agency or joint meetings to consider school planning in relation to community planning

5. A balanced capital program for the area and an orderly schedule for essential capital needs, both school and nonschool

6. Assurance that no public or private housing developments will be authorized without advance provision for adequate school sites.

Cooperation with Other School Systems. Any group of local school units with common educational or school-building problems can create a joint committee to study these problems, representing school-board members, staff, and lay citizens. The same principles and techniques that apply in community studies apply to such joint committees. Among the problems which appropriately can be studied by such a group are:

1. The unmet educational needs and shortcomings of present educational programs in the area

2. Attendance areas and existing school locations in terms of size, programs, convenience, utilization, economy, and other factors

3. Population, housing, transportation, and other social and economic trends affecting school buildings in the whole area

4. Cost of present operations and cost of building under the existing structure as compared with cost of joint operations

5. Ways and means for overcoming existing deficiencies or high costs

6. Effects of building upon local resources under existing governmental structure as compared with building under various alternatives

7. Desirable future school-attendance areas, school locations, and district-boundary changes

COORDINATION OF STUDIES

Where a school system is working cooperatively with other agencies in gathering the information essential for planning a school-building program, provision must be made for coordination of studies. If the school administrator himself is not in a position to act as coordinator,

he should, if possible, delegate this responsibility to one of his staff. The same problems exist where citizen groups are participating in studies sponsored by the school system.

The successful coordination of studies depends upon a number of administrative provisions. Among these the following are very important:

1. Seek competent advice in planning studies or in reviewing projected studies.

2. Prepare a schedule of jobs to be done and assign the job to the person or agency best able to do it.

3. Devise a system of reporting progress and controlling progress on various tasks.

4. Make provision for securing thorough understanding of each assignment on the part of the person or persons responsible.

5. Center attention upon the problem and objectivity in the work. Discourage solutions or answers formulated before all relevant facts are available.

EVALUATION AND USE OF DATA

Facts are essential for determining school-building needs and the soundest course of action for meeting these needs. However, facts by themselves will not result in wise decisions and intelligent planning. All data are subject to limitations, but the kinds of data involved in school-facility studies have to be used with understanding and care. Past and current facts have to be projected into the future. At best this is an uncertain kind of knowledge. In the chapters which follow considerable attention will be given to the problems of properly evaluating and using various kinds of data. Possible solutions which will allow for contingencies and varying margins of error will be stressed.

Data are no substitute for insight, judgment, resourcefulness, imagination, and intelligence. These are what make it possible to discover new solutions, anticipate consequences of various courses of action, foresee contingencies, and plan alternate uses for facilities.

SUMMARY

Chapter 5 has presented in outline form a synopsis of the kinds of questions asked, methods of processing data, and the sources of data in making a survey of the school-plant requirements of a community.

It is evident that an understanding of the region to be studied should precede a detailed inquiry or the painstaking collection of specific data concerning a community. This understanding is advisable because of such frequent problems as the probability of district-boundary changes, the overlapping units of school government often found, and the apparent instability of existing local units.

Ideally the kinds of information necessary for a school-plant survey should be kept continuously available in school districts; but actually a special effort is demanded to acquire all needed information systematically. It would also be desirable to have established an orderly plan of cooperation with other governmental agencies.

Nevertheless much valuable information is acquired by various processes of informal exchange. Planning agencies should be encouraged to make the flow of such information more systematic. More could be accomplished by way of joint action among contiguous school districts.

For efficiency and economy, the coordination of studies is an objective in government worth promoting. However, a word of caution is needed: while on the one hand, having reliable source data is essential to making good estimates, on the other hand, there is no substitute for imagination and foresight in the interpretation of the data.

DISCUSSION PROBLEMS

1. Review several of the better-quality reports of school-building surveys. Prepare an item analysis showing the frequency with which given types of data listed in this chapter (e.g., parochial school enrollment, spot maps of pupil residence, amortization schedule of present indebtedness, taxable valuations, birth-rate trends) are contained in such reports.

2. You are to conduct a survey of the school-building requirements of a given school district, and you will direct the activities of several assistants. Prepare on index cards the assignments for your assistants, stating a separate and definite task on each card. You may also show the probable local sources of information and a sketch of how you wish to have the data reported to you.

3. Which school districts in your state need special state assistance? Give the criteria for identifying such districts.

4. What role may the intermediate unit have in the planning and finance of school building?

5. Should the survey of school-building needs be made on a neighborhood, school district, or regional basis?

6. Under the following chapter headings, develop an outline of the data you would include in a report of school-building requirements for a school district:

   Nature of the community
   Community program for education, recreation, and cultural improvement
   School system
   School population
   School-plant facilities available
   Educational specifications for new construction and modernization
   Finance

7. Why is it necessary for school people to bring in other agencies in planning for a building program?

8. Assuming that an adequate "master plan" for school-plant development has been adopted on the basis of a thorough community survey such as sug-

gested in this chapter, which items of information should be kept continuously up to date as the master plan is implemented or revised? In what priority of importance?

9. Assuming the school administrator has all essential data available in his files or readily collectible, what would be his best procedure for preparing the manuscript of his report of these data to the school board and the public?

RELATED READINGS

Butterworth, Julian E.: "The Study of the Intermediate School District in New York," *Journal of Educational Research*, 41:88–96, October, 1947.

——— and Howard A. Dawson: *The Modern Rural School*, McGraw-Hill Book Company, Inc., New York, 1952.

Dewhurst, Frederick, and associates: *America's Needs and Resources*, Twentieth Century Fund, New York, 1947.

Engelhardt, N. L., Sr.: "The Thruway, the Parkway, and the Freeway," *American School Board Journal*, 131(5): 36–38, November, 1955.

———: "School Building Problems of Large Cities," *The American School and University*, 23:125–130, 1951.

———: "School Building Surveys Mean Better School Plants," *School Executive*, 72:60–61, November, 1952.

Flesher, W. R., E. B. Sessions, T. C. Holy, and others: *A Study of Public Education in Watertown, New York*, Bureau of Educational Research, Ohio State University, Columbus, Ohio, 1947.

Gregg, Russell T. (ed.): *Planning Modern School Buildings: Proceedings of the Institute on School Buildings*, University of Wisconsin Press, Madison, Wis., 1948.

Halverson, J. J.: "School Plant Planning as Part of Overall Community Planning in Small Cities," *The American School and University*, 17:31–34, 1945.

Harap, Henry, and W. Knox McCharen: *A Survey of Surveys*, Division of Surveys and Field Services, Peabody College, Nashville, Tenn., 1952.

Holy, Russell A.: *The Relationship of City Planning to School Plant Planning*, Contributions to Education No. 662, Bureau of Publications, Teachers College, Columbia University, New York, 1935.

———: "The Exchange of Information between Boards of Education and City Planning Commission," *American School Board Journal*, 119:29–30, July, 1949.

———: "City Planning and How Zoning Affects the Location of School Buildings," *American School Board Journal*, 120:32–33, January, 1950.

Holy, Thomas C.: "What Future Needs Are Revealed by School Population Studies?" *The Education Digest*, 9:24–26, May, 1947.

Kreitlow, Burton W.: "Factors Limiting School Reorganization," *Nation's Schools*, 51:2, 81–84, February, 1953.

Linn, Henry H.: *The Report of the Survey of the Building Requirements of the Public Schools of Nutley, N.J.*, Institute of Field Studies, Teachers College, Columbia University, New York, 1949.

MacConnell, James D., and William R. Odell: *Missoula Plans Its Educational Future*, Stanford University Press, Stanford, Calif., 1952.

Paxson, Alfred M.: *Relationship of Open-country Families of Onondago County, New York, to Socio-economic Areas, Villages, and Cities*, Bulletin 584, Cornell University Agricultural Experiment Station, Ithaca, N.Y., 1934.

School of Education: *Making an Area Study*, Bureau of School Services, University of Michigan, Ann Arbor, Mich., 1951.

Strayer, George D., and Yaeger: *Report of Mayor's Management Survey; New York City Schools*, Board of Education, New York, 1951.

Strevell, Wallace H.: *School Building Requirements of Angleton Independent School District*, Board of Education, Angleton, Tex., 1956.

———: "School District Records Predicate Future Enrollments," *Educational Administration and Supervision*, 38(2):102–106, February, 1952.

Urban Patterns, University of Chicago Community Inventory for 1950, Chicago, 1954.

Wells, Guy F.: "The First School Survey," *Educational Review*, 50:166–175, September, 1950.

Wochner, R. E.: "School District Reorganization Activity in the United States," *American School Board Journal*, 117:25, September, 1948.

CHAPTER 6

Development of Community Standards for School Facilities

The superintendent of schools must have a basis for measuring needs for school facilities, securing community agreement on needs, evaluating existing plant facilities, and recommending a program for providing the facilities needed. The needs for school facilities are based primarily upon educational objectives and the theory and practice developed for achieving these objectives—the educational program. However, the needs cannot be defined solely in terms of existing objectives and programs. Since facilities are provided largely for future use, needs must be defined in terms of probable changes or the possibility of changes which cannot be anticipated in advance. The same generalization applies to concepts of safety, sanitation, esthetics, structural durability, and other noneducational aspects of facilities which are conditioners of need.

Existing facilities cannot be evaluated nor can the character of new facilities or sites be defined without standards on the foregoing matters. Hence, the first step in making a study of school-plant needs is that of developing appropriate community standards with respect to school facilities. The place to start is with an examination of existing standards as developed by state educational agencies and school-building specialists. The next question is the extent to which such standards are appropriate for the particular community now and in the future. What factors determine their appropriateness? To make a decision on the question, what data are needed regarding the community and its evolving educational program?

PUBLISHED STANDARDS OR GUIDES

A number of authorities in recent years have undertaken to state in whole or in part the minimum standards or guiding principles for evaluation of school facilities. Perhaps the most common are publications of state departments of education and agencies engaged in school-plant research. The National Council on Schoolhouse Construction's *Guide for Planning School Plants,* which is revised periodically, constitutes the most complete single source of information. A selected list of references, including publications of the U.S. Office of Education, is given in the bibliography for this chapter.

Resource Center. An adequate technical library in the field of school-plant development should be furnished in a conference room for the convenience of school-board members, staff members, interested lay groups, and specialists who are making studies and meeting for discussion. Monroe's *Encyclopedia of Educational Research* reports over 3,000 publications and articles in the ever-expanding literature on school plant in the past two decades. Periodicals that regularly feature school-plant development are *American School Board Journal, Nation's Schools, School Executive,* and the annual *The American School and University.* The research on school plant and equipment is periodically reviewed in *Review of Educational Research* by the American Educational Research Association. Pamphlet materials may be secured from state departments of education, several universities, U.S. Office of Education, National Education Association, American Council on Education, Association of School Business Officials, New England School Development Council, National Recreation Association, National Council on Schoolhouse Construction, and various state commissions on school building, district organization, and public finance.

Published Surveys. A collection of published surveys will suggest many investigative techniques. The history of surveys has been the history of distinguished educators; Henry Barnard is credited with conducting the first American school survey in Rhode Island in 1843. Considerable standardization of school-building surveys may be observed today, and the recent increase in survey reports of creditable quality is probably a result of the complex, big-business nature of the current demand for sharply stepped-up schoolhousing construction. Standardized school-plant-measurement devices were established by Cubberley, Strayer, Engelhardt, and others more than a quarter century ago, permitting comparisons among city districts. The subsequent history of this movement was one of research and refinement in the techniques. Of recent years a wholesome interest has been shown in school planning and experimenta-

tion with new design solutions, and this trend is reflected in recent reports as a new challenge to surveyors.

General Standards. On the basis of these sources there is summarized below for convenience of the reader a statement of current published standards. By comparing this with older or more recent statements, it is possible to determine the direction in which the thinking of school-building specialists is moving.

Code numbers below relate to the *School Plant Survey Record* exhibited in Chapter 7. These standards are intended for use with the *Survey Record.*

CHECK LIST OF MODEL STANDARDS

STANDARDS FOR STRUCTURAL FEATURES

1.1 *Building structure*

1.11 Condition of structure

(*a*) Foundation. Should support load without shifting, settling, or cracking. Foundation walls should be verminproof and rodentproof. Adequate drainage is essential.

(*b*) Exterior walls. Should be plumb, with junctures aligned, free from cracks, and impervious to moisture seepage. Walls should be maintained against deterioration.

(*c*) Windows. Adequate natural illumination should be possible some hours of the day in most rooms. Window frames should be sealed and fit snugly against climatic conditions and not be deteriorated. Weather stripping may be desirable. Windows should be accessible for cleaning.

(*d*) Roof. Objectives are weatherproofness and insulation. Examine for needed repairs or structural weakness. Roof valleys, drains, and downspouts adequate; roof economical to maintain. Attic spaces should not be used for storage of inflammables.

(*e*) Floor structure. Level and rigid, free from decay; structural strength adequate for load. There should be no moisture seepage. Structure should permit replacement of floor finish. Floors should be nonskid and free from projections, splinters, broken tile, etc.

(*f*) Interior walls. The walls should be soundproof and sound absorbent. They should be of a construction type that is adaptable to desired finishes and equipment. Note should be taken of modular construction to facilitate partition changes.

(g) Ceilings. The height of room and corridor ceilings should be economical of heating, air conditioning, illumination, and ventilation per capacity. Special ceiling heights, as in assembly rooms, gymnasiums, or certain shops, should be related to plan type. Finish of ceiling should consider appearance, light reflection, and acoustics.

1.12 Plan type. While no single pattern is ideal for all circumstances, it is agreed that elementary grade and public usage should be at ground-floor level. Although multistory construction saves plot area and has some elements of efficiency for departmentalized programs, its economy is questionable. Basements and attics are wasteful of space. The plan type should provide low initial cost, low cost of upkeep, economical operation, and desired educational features. The best plans are flexible, expansible, and functional. Corridor runs should be reduced. Fenestration should not be obstructed. All space should have a high rate of utility.

1.13 Appearance. External design should be consistent with the better structures of the community. Design should be adapted to contour and setting. The school building should have a commanding location, set back *at least* 50 to 100 feet from the street. The building design should be coherent and related to walks, drives, and other environmental features. Difficult-to-maintain roof designs are discouraged, but simple harmonious proportions and themes add attractiveness. Additions should not conflict unnecessarily. Marks of deterioration detract from appearance.

1.2 *Safety and circulation*

1.21 Type and condition of stairs and stairwells. Stairs should be fire resistive, well lighted, with firm handrails. Stair treads should be non-skid, at least 10½ inches wide, with about 6½-inch risers, with at least 4 foot intermediate landing per 10-foot rise. Ramps should replace short rises of interior stairs. Stairwells (modern replacement of hazardous fire escapes) should be fireproof and smoke screened. Glass partitions are undesirable. There should be no danger of explosion or early heat disintegration within fire wells. They should open by immediate exit to safe and clear egress.

1.22 Location of stairs. Generally stairs should be at right angles to main corridors for expansibility. Multistory buildings shall have stairs within 100-foot traveling distance of classroom exit. Each end of every corridor should terminate on an egress or at a stairway, or within classroom length of same if structure is fire resistive.

1.23 Corridor width and location. Minimum width of 9 feet exclusive of lockers, and more width for additional load. There should be no obstacles to impede traffic. There should be no pockets, bottlenecks, or dead ends. Width should accommodate not only free exit but also operational flow of traffic. Directions should be evident or clearly shown. Exits and stairways should be marked with illuminated signs operated from independent lighting source.

1.24 Condition of corridors. Minimum illumination of 5 foot-candles. In multistory buildings the corridors, walls, floors, and ceilings should be of masonry construction of at least 2-hour rating. Wainscot should be clean, and floors, walls, and ceilings free from cracks, broken tile, or deterioration. Acoustical treatment is desirable.

1.25 Number and location of exits. Refer to state and city building codes

and "Building Exits Code" of National Fire Protection Association. Direct exit from each stairwell. Additional units of door width per 4,000 square feet of gross first-floor area and 600 square feet of auditoriums and gymnasiums on the first floor. At least one first-floor exit within 100 feet of a doorway of every classroom.

1.26–1.27 General safety. Corridors and exits should be capable of emptying the building to a safe place in under three minutes. Two or more exit doors from each nonfireproof classroom; all doors with nonlocking fixtures; panic bolts on exit doors. There should be no risk of blockage as by smoke or explosion. No doors should be locked against egress from inside. Fire escapes should be inspected for safety. Fire extinguishers should be accessible at all floors in not less than 100-foot intervals along corridors and at fire-risk points. There should be no unguarded hazards of chemicals, electrical wiring, gas seepage, boiler explosion, machinery, steam lines, or accidental injury. Fire hydrants should be accessible. Exits, playground approaches, and bus loading should be free from traffic dangers.

STANDARDS FOR MECHANICAL FEATURES

2.1 *Heating and ventilation*

2.11 Type and condition of heating plant. Related capacity for efficient results, fuel costs often govern choice of heating plant. In general central low-pressure steam system are preferred in colder climates. Room units must be simple and effective to reduce their operation and maintenance costs. There should be a minimum of distracting noise, dust, and custodial labor. Machinery attachments should be engineered to prevent expensive failures. Central heating control of building zones is desirable. Hot-water units should be separate. All safety controls should be automatic. Adequate chimney stacks are a cost saving. The heating plant should be synchronized to operate in part or in full.

2.12 Type and condition of heating system. Since heating and tempered ventilation may be combined, the final test is total efficiency. Insufficient radiation may be costly. The system may need to compensate for faulty building structure. Gravity return lines are preferable to pump systems, although not always feasible.

2.13 Heating efficiency. Desk-level temperature where pupils are seated should be about seventy degrees F; gymnasium, corridors, etc., about sixty-five degrees F at 5-foot level. Floors should not be cold. Air leakage should be at a minimum and insulation sufficient to operate economically on fuel supply. Heat loss should be minimized with entry compartments and regulated ventilation. Capacities and radiation should not require excessive forcing. Simple, low-pressure systems require less labor and attention.

2.14 Boiler-room layout. Work space should be provided around boiler and machines. Fuel supply to boiler should minimize labor. General storage and custodian's office space should have good relation to out-of-doors entrance and to custodial duties. Disposal of waste should be

economical. Furnace and fuel rooms should be fire resistive, with self-closing fire doors if located within school. Service systems should be of standard specifications and readily available for inspection and repair.

2.15 Type and condition of ventilation. Stale or odorous air indicates poor ventilation. Lavatories and certain other areas require separate mechanical ventilation. In general mechanical ventilation would supplement natural ventilation where necessary to maintain healthful circulation of air and controlled humidity for comfort, especially in cold seasons.

2.16 Controls. Individual room controls should be provided, preferably automatic and adjustable. Controlled natural ventilation is preferable to completely mechanical ventilation in most seasons and climates.

2.17 Air conditioning. Generally used for particular units or zones of public school buildings. Desired objectives are uniform, comfortable temperature and humidity control. Adequate ventilation is essential. Reduction of cost—especially upkeep, power, and sources of heat infiltration —is major problem. Spot cooling with automatic controls is most flexible plan. Noise level must be kept low.

2.2 *Plumbing facilities*

2.21 Toilet-room adequacy. One toilet unit per thirty elementary and per forty-five secondary school pupils with water closets and urinals in equal ratio in boys' toilet rooms. One lavatory unit per forty pupils. Generally toilets for each sex should be on each floor. Separate toilets for dressing rooms, offices, health room, etc. Toilet facilities for public use and team use desirable in connection with general-use rooms.

2.22 Toilet-room conditions. Toilet-room floors, wainscots, partitions, and fixtures should be of a smooth, moisture-resistant finish as ceramic and glazed tile that may be scrubbed and flushed clean. Concrete floors not recommended. Good illumination, freedom from odor, and separate positive ventilation are requisites. Fixtures should be of good-quality institutional design. Arrangement and type of fixtures should consider educational goals.

2.23 Water facilities. Ample supply of hot and cold water when and where needed—especially all activity rooms as self-contained classrooms, shop, art room, library, commercial, home economics, cafeteria, dressing rooms, teacher rooms, offices, etc. Also, adequate sewage disposal. Water facilities should be safe and protected. Good-quality institutional fixtures are recommended.

2.24 Drinking fountains. On each floor at least one fountain for every seventy-five pupils for whom room fixtures are not provided. Also fountains for play areas and where needed by public. Sanitary and safe fixtures, preferably recessed. Standard institutional fixtures are preferred. Water cooling is standard in warm climates.

2.25 Individual room installations. Such installations should be of standard institutional type. Provision should be made for instructional needs of special rooms. Room installations should be located with a view to

efficient circulation and noninterference with other room activities. They should avoid restricting alteration of spaces.

2.26 Showers and special equipment. Durability, convenience, safety, and sanitation of shower rooms are among the objectives. Shower rooms require special ventilation. Permanent building equipment, such as ventilation units, should be administratively controlled. Swimming pools must conform to safety and sanitation standards. In general the location of permanent instructional equipment should permit flexibility in use of space and allow for adequate supervision.

2.3 *Electrical services*

2.31 Power installation and control. Capacity of power installation should be adequate for present and anticipated future load. Central control units should be protected against fire hazard, tampering, or danger to personnel. Generally power installation should contain provisions for expansion.

2.32 Communication and signal system. The system should be administratively efficient and promote educational purposes. At least one telephone is necessary. Program clocks and signals ore standard equipment.

2.33 Alarms and exit lights. Manual or low-voltage fire gongs located so they may be heard throughout building; control switches at fire danger points and within 200 feet of any point on o floor level; automatic controls. Exit lights for auditorium gymnasium, corridors, fire escapes, and first-floor exits administratively controlled.

2.34–2.35 Room installations. All classrooms require electrical service outlets. Electrical power and gas outlets located to allow for flexibility of space arrangement. Special power installations should be available where the instructional program requires.

2.36 Electrical and related safety. All wiring enclosed in pipe conduit; switches independent of fixtures and central-control panels are among the safety features. All wiring and connections should comply with Underwriters Code. Intense heat should be shielded from combustibles. Hazardous motors should be protected. Chemicals safely stored.

2.4 *Illumination*

2.41 Number and type of fixtures. Consult manufacturer's standards for type of fixture used. Uniformly distributed illumination without shadow or glare is the optimum condition, although wasteful loss of output should be avoided.

2.42 Quantity of illumination. Intensity of 30 foot-candles in classrooms, 20 foot-candles in gymnasiums, 10 foot-candles or more in auditoriums, cafeterias, locker rooms and stairways, 5 foot-candles or more in storerooms, 50 foot-candles for close work. The illumination ought to be uniformly distributed at desk level.

2.43 Quality of illumination. With recommended minimum reflection factors of ceiling 80 per cent, walls 60 per cent, floors and desks 30 to 50 per cent, the light should be present without undue shadow or glare. Glossy and glaring surfaces or light sources should not be in line

of vision. Brightness-balance is a key to visual comfort and efficiency.

2.44 Controls. Artificial illumination and natural illumination should supplement each other for uniformity. Also, natural illumination must be controlled against eyestrain due to excess, direction, or variability. Manual control of series of lights properly placed is desirable.

2.45 Effect. Maximum use of natural light is a measure of economy, but sharp contrasts, poor orientation, or poor light reflection will reduce its efficiency. Sky glare should be shielded. Color harmony and reflection factors of the room, with even illumination, should promote eye ease.

STANDARDS FOR EDUCATIONAL FEATURES

3.1–3.4 *Educational facilities—spaces* (Refer also to Chapters 8, 12, and 18.)

(*a*) Location. General-usage rooms, like auditoriums, gymnasiums, etc., should be adaptable to possible building expansion. Grouping of spaces should conform to educational schedules without undue traffic conflicts or unnecessary distraction. Indoor and outdoor activities should be planned in corelationship. Public usage should be zoned for convenience and supervision. Awkward operational arrangements should be avoided.

(*b*) Size. Classrooms: elementary—net 35 square feet per pupil with a minimum of 900 square feet; secondary—net 30 square feet per pupil with a minimum of 700 square feet. (Special rooms—refer to NCSC, *Guide for Planning School Plants.*) The test of size is the well being and physical activity of the group assigned to a room. However, long-range usage must be considered, which means that room size must be flexible to probable future needs. The over-all size of room must consider spaces for related activity; e.g., areas related to laboratories, shops, library, auditorium, gymnasium, cafeteria, classrooms. Room size must bear a reasonable relationship to probable enrollment.

(*c*) Shape. Provides for pupil activity, group coordination, ease of circulation, and full supervision. Separation of areas should have a useful purpose. No distraction, as poor acoustics or vision obstruction, should exist; but variety of shape is acceptable.

(*d*) Floor, wall, ceiling finish. Material and texture giving durability; resistance to unusual wear as acid or scuffing; sanitation and efficiency of maintenance and cleaning; acoustical quality, insulation, light reflection, eye ease, and decorative effect. Finish should permit ease of cleaning and not limit installation of equipment.

(*e*) Seating. Suited to health needs of child and departmental functions. In general seating should be flexible to the possible teaching arrangements, and if necessary removable for stacking in order to free the room areas. Modern functional seating is preferable to stylized seating or fixed seating in most building areas. Adaptability of seating and desks to multiuse is desirable.

(*f*) Room storage. Ample and convenient for equipment and supplies regularly used in the room. Flexibility of storage units for changing needs is desirable; either built-in or movable cabinets of modular dimensioning.

Storage of pupils' individual work supplies should be efficient for classroom activities and adequate. Storage related to special teaching areas should have necessary shelves, racks, etc. Office records should be preserved in fire-safe vault.

(g) Wardrobe. Criteria are adequacy for the enrollment and normal storage, convenience of access, ease of supervision, sanitation and ventilation, security, and good relation to circulation. Special provisions for adult wardrobes, gymnasium dressing rooms, and community use of building.

(*h*) Decoration Rooms should be cheerful and attractive. The decorative scheme may depend upon proportion, color, and texture without ornamentation that would be objectionable in upkeep or custodial care. Surfaces that stain or discolor and cannot be refinished are to be avoided. Fixtures like chalk boards, display boards, storage cabinets, electric-light fixtures, and building equipment ought to be harmonious. Artistic elements are acceptable if in good taste. Functionalism is the present motif.

(*i*) Lighting. Adequate to the purpose and working conditions of each room, especially from standpoint of the pupil.

(*j*) Heating. Uniform and controlled in each room, without drafts, excessive noise level, or dust. Controllable ventilation is usually desirable.

(*l*) Equipment. Desks, tables, maps, globes, etc., conforming with learning activities and sufficient for pupils enrolled. Special equipment, such as stoves, refrigerators, machines, utility outlets, etc., available for laboratory teaching. Full utility of wall space for chalk boards, bulletin boards, and display at height suitable for age of children.

(*m*) Special installations as visual-aids facilities. Special rooms, as auditoriums, cafeteria, laboratories, etc., should be completely functional. Check lists may be applied to each specialized room.

3.5 *Efficiency of educational facilities*

3.51 Suitability for educational program. Otherwise acceptable building units must have an efficient relationship. It must be possible to use spaces for intended purposes, to have needed spaces on a reasonable schedule, to circulate with minimum confusion, to work without undue distraction, and to gain a high utilization ratio of space. If the building is overcrowded, this factor must be evaluated both as to existing conditions and as to usage under normal capacity.

3.52 Flexibility. Multiple use and versatility of spaces should be provided. Control should permit desired zoning of building. Building should lend itself to desired community usage.

3.53 Economy of effort. Pupil traffic should be direct and not excessive. Offices should be conveniently located for both supervision and public access. There should be a minimum of noise or other distraction. Storage should be readily accessible. The teaching areas should have a logical relationship.

3.54 General storage. Adequate central storage for books, equipment, supplies, records, etc. Storage of special seating and equipment conven-

ient to anticipated use. Storage planned for good utilization of space. Provision should be made for removal of broken or unused equipment to central storage.

3.55 Custodial service. Provision for utensil storage and service sinks in each major area or floor; equipped workshop for custodian; general tool and supply storage; safe combustible-material storage; office, locker, washroom, and shower facilities; and special grounds storage. Facilities encourage efficiency and morale. General convenience for repair and replacement of equipment. Efficiency of installation and storage of movable furniture and equipment, especially in multiple-use areas. Service systems operate without excessive mechanical difficulties.

4.1 *Site adequacy* (Refer to Chapter 11.)

Standards Established by the State. The freedom of local school systems to develop school-plant standards appropriate to a community sometimes is restricted by state-enforced minimum codes. Although local units at any given time have to be governed by the laws or regulations as they stand, this fact does not preclude local administration from striving to have outmoded or unduly restrictive state requirements changed.

An analysis of state controls over school-building standards shows a range from almost complete local control and almost no state activity in some states to a high degree of central control in some other states. In at least eight states some agency other than the state educational agency has the power to approve school buildings, including such agencies as the state fire marshal, the state department of health, or a building agency. Colorado, for example, has given its state planning commission power to supervise school buildings. Most states have statutes enforced by the chief state school officer that apply to school buildings or all public buildings.[1]

Another way of classifying existing state and local relationships would be as follows, in descending order of centralization:

1. Exercise of the regulatory powers of the state to enforce state requirements relative to educational space provisions in school plants—through statutes, education department regulations or standards, the approval of sites, plans, or buildings, the preparation of plans for school buildings, reports, and inspections by a state agency

2. Exercise of the police powers of the state to protect the health and safety of pupils—through statutes; building codes formulated and enforced by a state agency; approval of sites, plans, and specifications, or school buildings themselves by a state agency; reports; inspection;

[1] *State Boards of Education and Chief State School Officers*, U.S. Office of Education, Bulletin 1950, No. 12, Washington, 1950, pp. 102–103.

supervision of construction; or condemnation of buildings by a state agency

3. Exercise of leadership in planning and mapping of desirable district reorganization in relation to attendance areas, transportation routes, and the location of school facilities—requiring that any proposed reorganizations aided by the state fit into the over-all plan

4. Exercise of leadership to promote improvements in school building, planning, and construction—through research, experimentation, publications, consultations, surveys, field service, in-service education, and other advisory means

Sound state and local relationships depend upon the ultimate outcome desired—centralized government or local government in education. Unless local leadership is vocal and active in shaping or modifying state policy, the decision will be influenced largely by central agencies which too often in the past at least have resorted to central controls to achieve quick results. If a state and its localities believe in the superiority of local control and operations and the beneficial long-run results of active citizen participation in local school government, its policies in state and local relationships should be directed toward (1) strengthening the legal power, structure, functioning, and management of local school units; (2) concentrating upon the leadership, persuasive planning, advisory, consultative, and technical services of state agencies to improve local operations, pending the attainment of strong, effective, local units; (3) avoiding or using sparingly mandates, regulations, prescriptions, approvals, inspections, reviews, or other enforcement of state standards; and (4) reviewing from time to time any such centralizing tendencies as have been adopted and removing them as the strength of the local structure grows.

These goals parallel very closely those adopted by the National Council of Chief State School Officers.[2] However, the Council is not so critical of the centralizing tendencies inherent in state minimum standards. It is the position of the authors that such requirements are symptomatic of an unsatisfactory local structure or inadequate financial provisions for school support. Statutory requirements relating to school buildings and sites, and regulations or standards regarding them prescribed and enforced by a state agency, the approval of sites, plans, specifications, supervision of construction, and inspection of school buildings by a state agency are centralizing tendencies or central controls and should be used sparingly to protect the health and safety of children and the future educational usefulness of the plant. They should improve the local governmental and financial structure for schools and the local management of school operations.

[2] *Our System of Education*, National Council of Chief State School Officers, Washington, 1950, p. 21.

State school-building standards based upon past or current knowledge and practices can freeze operations into a mold for decades. A mistake once enforced statewide can do much more harm than the isolated mistakes of local operators. The danger in statutory requirements relating to school buildings is that they are generally difficult to repeal or modify.[3] New York State, in 1904, adopted a statute requiring that no school building be approved unless provisions had been made for assuring at least 30 cubic feet of pure air every minute per pupil and for exhausting foul or vitiated air independent of atmospheric changes. The New York State Commission on Ventilation (1923), The Mastick Commission (1929), and the Regents Inquiry (1936) all recommended its repeal, but it was not repealed until 1940. For thirty-six years school districts had been required by statute to make a wasteful investment in expensive mechanical ventilation.

Statutes should allocate responsibility for school building between state agencies and local units, provide authority for state or local units to formulate and enforce school-building codes to protect the health, safety, and investment of public funds, and provide for the financing of school buildings. Although school-building codes, regulations, or standards promulgated by the state educational agency are easier to change than statutes, this does not prevent them from imposing upon localities standards that have not been conclusively demonstrated by research and experimentation, that have become outdated, or that prevent desirable changes in educational policies, programs, methods, and practices.

There has been a considerable lag in modifying such standards. Rigid and specific codes prevent flexibility and adaptability and become obsolete relatively fast. Many state school-building requirements, for example, have contained specified ratios of floor area to window area which mandate certain ceiling heights. Some of the older ones resulted in ceiling heights of 13½ feet. Some of those still in effect require approximately twelve-foot ceiling heights. Yet, with modern improvements in lighting and attention to all factors that affect the quality of light, ceiling heights of 9 feet are possible.[4]

Under older standards long, narrow classrooms are required; under current New York State standards a variety of more functionally shaped rooms are possible with reduced corridor lengths.

The formulation of a model building code is a highly technical undertaking which can be done more effectively and kept up to date better by a well-staffed state agency than by each locality independently. Since

[3] Milton W. Brown, *Standards for School Plant Construction Established by State Requirements*, University of Chicago Press, Chicago, 1946, p. 160.

[4] *Third Report*, New York State Commission on School Buildings, Albany, N.Y., 1952, p. 27.

school buildings are a specialized type of structure, a model state school-building code might well be prepared and kept up to date by a competent staff in a state educational agency. Such a code might be left to local adoption or promulgated on a statewide basis. Experience with local school-building codes as applied to school buildings has not always been satisfactory.[5] However, if a code is enforced statewide, exceptions should be made where necessary to meet special local conditions.

If a school-building code is not to have more disadvantages than advantages, certain principles must be adhered to:

1. It should be limited to the fewest provisions necessary to protect the health, safety, comfort, and future usefulness of the facility for school purposes.

2. Provisions designed to promote health and safety should be expressed as performance standards rather than as specific construction details, methods, and materials which soon become outmoded.

3. Provisions designed to protect the future usefulness of the plant should be expressed in terms of such concepts as internal flexibility, expansibility, provisions for alternate use of spaces, location, and utilization, rather than as detailed and specific space requirements which themselves may impair the future usefulness of the plant or limit its adaptibility.

Approval of school sites, plans, specifications, and even buildings themselves is becoming a general practice among states. In some instances this is limited to enforcement of state requirements and recommendations for local consideration. In other instances it involves a high degree of discretionary control from state to state by state agents over (1) determining the need for the facility, the suitability of location and site, its place in a long-range program, and its future usefulness; (2) making preliminary drawings in terms of functional planning, size of building and site, possibility of extension or expansion, proper and suitable educational spaces, arrangement of spaces, and other factors; and (3) preparing final working drawings and specifications and erecting the building itself.

Approval of sites, plans, and specifications with relatively few prescriptions and considerable discretionary authority when handled by a competent staff with an experimental attitude and strong regard for local freedom, flexibility, and adaptability is much less objectionable than statutory requirements or state building codes, standards, or regulations. On the other hand, it represents central control by persons rather than by laws and can result in unintentional shifts of control from localities to states. Laws, regulations, codes, and standards at least are explicit

[5] John W. Sahlstrom, *Some Code Controls of School Building Construction in American Cities*, Bureau of Publications, Teachers College, Columbia University, New York, 1933.

and can be weighed in terms of their effects. If undesirable, they can either be removed or modified.

State educational agencies can hardly afford to spend time preparing plans and specifications for buildings, approving plans and specifications, inspecting buildings, or supervising school-building construction in view of the many educational services which they should perform for localities and their limited staffs. In 1952 only thirty-one states employed one or more school-building specialists. And many of these have only one or two such employees.[6]

Most school districts do not have a continuous school-building program that would justify the employment of school-building specialists. Even those that do employ one or more such specialists require certain services from outside agencies. If a state educational agency is to perform this specialized service for local operating units, it should concentrate upon those aspects of school building which will yield the greatest returns including:

1. Providing technical assistance in determining the need for school buildings—guides for area studies, manuals on enrollment forecasting, manuals on making an inventory and appraisal of existing buildings, manuals on choosing between modernization and replacement of a plant needed in the long-range program, procedures and forms for local studies, and expert consultation in planning, conducting, and interpreting local studies

2. Cooperating in local studies, surveys, and planning for ultimate district reorganization—with attention to existing plants, improvement of attendance areas, transportation, location of future buildings, and related problems, and initiating and promoting state policies and actions to facilitate district reorganization, and the strengthening of local operating units

3. Preparing technical guides for school-plant planning—keeping local officials informed on new developments, potential economies, improved practices, latest research findings, and other information basic to sound planning and construction of schools, and providing consultative services in various states of planning, including site selection

4. Sponsoring institutes, conferences, university courses, workshops, and other devices for the in-service preparation of local school personnel and architects involved in school-building planning, construction, operation, or maintenance

5. Conducting research and experimentation in relation to school-building problems and evaluating new developments and practices not only within the state but in other states as well

[6] Fred M. Fowler, "School Plant Services from the State Educational Agency," *School Executive*, 72:43–45, November, 1952.

6. Reviewing preliminary plans with local school officials and architects and making suggestions for improved or more economical planning of buildings, sites, and the furnishing or equipping of buildings

THE LOCAL SCHOOL PROGRAM AND STANDARDS

One purpose of the community and educational studies outlined in the preceding chapter is to identify the types of facilities which are necessary to carry on the functions of the schools both now and in the future. Another important objective of such studies is to identify the local factors which necessitate modifications in accepted standards for such facilities. In regard to these and the matter of adaptability to future changes the school board must rely upon the advice of its superintendent and his staff.

The studies of the local educational program should result in a listing of facilities essential for carrying out the program—classrooms, special rooms, service areas, and site provisions. Various standards have been formulated for all types of facilities commonly developed for schools. Which of these are applied to a given listing of facilities largely determines the aggregate need.

The list of facilities derived from any study of an educational program can vary considerably depending upon whether the list is based upon the existing program, or the program upon which general community agreement can be secured at any given time, or the program which someone or some group thinks the community should have. The program which a community will have five, ten, twenty, thirty, or forty years later may not resemble any of the foregoing. The practical school administrator will proceed upon the basis of what the community will sanction at any given time. Having translated this program into physical requirements, he will proceed to find solutions which will provide maximum accommodation for change. The wise school administrator will try to secure facilities which can be made to serve the various ideal programs which can be conceived. He will apply standards which will facilitate adjustment to the unpredictable changes in program. He will avoid, in so far as possible, standards which may impede flexibility in use of space.

Where the program which a community will agree upon does not call for facilities which are presumed in generally accepted standards, the superintendent will use the standards to test flexibility. Could the standards later be applied to the specific facility? Could they be incorporated into the facility without incurring unreasonable costs?

It may happen that the standards enforced by law or a state agency are not always appropriate for a particular community. For example, New

York State has a minimum requirement of 900 square feet for elementary classrooms. As explained below, this is not always defensible for every classroom in every locality. Although local units must comply with the standard, this does not preclude planning which will enable the local unit to partition rooms into suitable sizes for its particular needs so as to assure maximum utilization of space. Indeed this is what resourceful school administrators do under the circumstances.

Classrooms. A substantial part of any list of required facilities will be classrooms. Current standards for elementary classrooms assume the continuance of the activity concepts of learning. No one knows whether this assumption will hold true or not. We do know that it is not universally accepted and not generally applied at the present time. Where the theory is not accepted, and even where it is accepted but not enforced, application of current standards leads to serious underutilization of space. It also creates serious utilization problems where a school system is not large enough to keep all classes about the same optimum size—between twenty-five to thirty-five pupils to a room.

A place for learning has to be described in terms which enable planners to translate concepts into structures and plot use. This is the function of standards. A standard which specifies that an elementary school classroom should have a minimum of 900 square feet or that a secondary school classroom should have a minimum of 700 square feet oversimplifies thinking about school-building needs. Several questions have to be asked about every such standard: Is it defensible now in this particular community? Will it permit maximum space utilization in the immediate future? Will it provide greater flexibility in adjusting to change than other possible solutions? Would it be better to incorporate the standard into structures now or to provide flexibility for applying it later?

Many school systems are justified in departing from the 900-square-feet minimum in terms of utilization. If the available facts indicate that teachers in a community will not use the space presumed for activity teaching methods or that a certain number of small classes can be anticipated, there might be a temporary justification for building some or all classrooms with less than a 900-square-feet area. Yet it is not defensible to do so unless such units are so planned and constructed that they easily and inexpensively could be converted to larger rooms at some later date if the program philosophy changes.

Some elementary school facilities eventually may have to be used for secondary school pupils, or some secondary school facilities may have to be used for elementary pupils. Standards for classrooms in secondary school buildings generally are different from elementary. The 700-square-feet minimum for secondary schools would serve only very small elementary classes in an activity program, but it might be adequate for

average-size classes taught by the traditional methods. Unless secondary school classrooms were conceived in terms of eventual expansion, they would not serve the activity-type elementary school program under normal class size.

Uniformity of secondary school classroom size is unrealistic in most school systems. Even large high schools have some small classes. In most high schools some classes will be very small. The typical secondary school program calls for a variety of class sizes which are apt to vary from year to year. The only solution known for the unpredictability of this factor is to have enough adjustable partitions to conform to the schedule of any given year or period of years. When the standard of 700 square feet is adhered to, it sometimes is necessary to divide two rooms into three small units for defensible space utilization. This is particularly true in high schools of less than 800 enrollment.

Standards for classroom facilities often call for built-in features which at some future date could restrict the use which can be made of them. It is essential that blackboard heights, furniture, furnishings, fixtures, and other features of classrooms be suitable for the age group presently using the room. Yet it is seldom, if ever, necessary to build such features permanently into the structure of the room. Most such items can be installed in a manner which makes it easy and inexpensive to adjust them for different age groups.

Special Rooms. An increasing proportion of the total space of school buildings is in special rooms—libraries, laboratories, cafeterias, kitchens, auditoriums, gymnasiums, health suites, offices, conference rooms, teachers' rooms, home economic suites, shops, music rooms, art rooms, and many others. Standards developed for such specialized facilities often call for built-in features and other attributes which make it difficult to convert them to different uses or obtain maximum use of the space during the school day.

The fact that these facilities are becoming more common, often representing over half the space in a building, and the fact that the standards for such facilities are formulated by specialists, often without due regard for a well-balanced total school program, place a heavy responsibility upon the superintendent of schools. He must view the total school program for a community. He must guard against overemphasis of certain objectives or the overspecializations and development of particular facilities at the expense of current operations or other elements of school-facility needs.

As long as pupils spend most of their time in classrooms, the first task in assessing needs for facilities will be to list the instructional rooms with appropriate standards for them. It is helpful to enumerate all of the specialized facilities which would serve the educational objectives and

program of the community. The layout for these should be modified to fit the local situation. Those standards which permit multiple use of specialized rooms, which permit easy adaptability of the space for other purposes, which minimize the demand for building space outside of the classroom itself, and which make intelligent use of out-of-door areas are most likely to serve the total program for the community.

Standards calling for highly specialized large areas and spaces difficult to utilize fully ought to be reviewed very critically. The possibilities of use by the school system of facilities which are available in the community should be thoroughly studied. The building of facilities for use by a number of schools can be explored. The possibilities of building facilities in conjunction with schools for school and community use and having some other unit of government share the cost should be examined.

The incorporation of highly specialized spaces within the main structure of a school building may be the most expensive way to provide facilities. Alternatives should be studied, such as a house converted to a home economics unit, the building of shops in a factory-type structure adjacent to the school building, the building of an entirely different-type structure immediately adjacent to the school building (connected in cold climates) for physical education activities, the combination school and public library, partly supported by the school district in or near a school building, and the campus type of development with certain specialized facilities designed for use by a number of grade levels.

Service Areas. Lobbies, corridors, toilets, reception rooms, stairs, and other service areas serve a useful purpose, but they are not as a rule frequently utilized spaces. The best solution is to eliminate as much of these kinds of spaces as possible. Standards for spaces such as these should be studied in terms of the functional space in a given building. Width of corridor, for example, depends upon the number of persons using the corridor at one time with due regard for safety, especially under emergency conditions. These matters seldom are given the study which is required to find the right solution for a particular school.

It is not possible to formulate a single set of school-building standards which can be applied uniformly throughout the United States or within a given state. Standards have to be modified according to community differences in educational objectives and programs, conditions affecting health and safety, and factors affecting structural standards. They have to be examined carefully to see that they do not impede the future usefulness of the facility. Standards have to be examined critically in terms of new developments in the construction industry—materials and methods. In regard to structure, mechanical features, plumbing, electrical services, and illumination the superintendent is advised to rely upon specialists in these matters.

average-size classes taught by the traditional methods. Unless secondary school classrooms were conceived in terms of eventual expansion, they would not serve the activity-type elementary school program under normal class size.

Uniformity of secondary school classroom size is unrealistic in most school systems. Even large high schools have some small classes. In most high schools some classes will be very small. The typical secondary school program calls for a variety of class sizes which are apt to vary from year to year. The only solution known for the unpredictability of this factor is to have enough adjustable partitions to conform to the schedule of any given year or period of years. When the standard of 700 square feet is adhered to, it sometimes is necessary to divide two rooms into three small units for defensible space utilization. This is particularly true in high schools of less than 800 enrollment.

Standards for classroom facilities often call for built-in features which at some future date could restrict the use which can be made of them. It is essential that blackboard heights, furniture, furnishings, fixtures, and other features of classrooms be suitable for the age group presently using the room. Yet it is seldom, if ever, necessary to build such features permanently into the structure of the room. Most such items can be installed in a manner which makes it easy and inexpensive to adjust them for different age groups.

Special Rooms. An increasing proportion of the total space of school buildings is in special rooms—libraries, laboratories, cafeterias, kitchens, auditoriums, gymnasiums, health suites, offices, conference rooms, teachers' rooms, home economic suites, shops, music rooms, art rooms, and many others. Standards developed for such specialized facilities often call for built-in features and other attributes which make it difficult to convert them to different uses or obtain maximum use of the space during the school day.

The fact that these facilities are becoming more common, often representing over half the space in a building, and the fact that the standards for such facilities are formulated by specialists, often without due regard for a well-balanced total school program, place a heavy responsibility upon the superintendent of schools. He must view the total school program for a community. He must guard against overemphasis of certain objectives or the overspecializations and development of particular facilities at the expense of current operations or other elements of school-facility needs.

As long as pupils spend most of their time in classrooms, the first task in assessing needs for facilities will be to list the instructional rooms with appropriate standards for them. It is helpful to enumerate all of the specialized facilities which would serve the educational objectives and

and other factors affecting structures; (3) land values, availability of sites, problems and cost of clearing sites, and other factors affecting the intensity of land use; (4) local building materials and construction methods; (5) local code provisions relative to health and safety and local conditions affecting these, such as population density, zoning, and traffic; and (6) community attitudes towards various styles of architecture and structures.

Background on the factors affecting school-building standards in a given community may not always be sufficient to determine which standards are appropriate and defensible. A community which seldom or infrequently undertakes school construction should study the experience of similar communities. Coastal communities have paid a heavy price for following standards not appropriate for their wind and moisture. Communities with severe winters have erected structures conceived for warmer climate. Communities in rural areas have wasted money on standards of safety appropriate for urban areas. These are but a few of the mistakes which flow from the uncritical use of standards.

SUMMARY

Starting with published standards as a guide, the local authorities may adopt their own basis for evaluation. This chapter has presented an abstract of the minimum standards currently recommended in publications of professional societies and governmental agencies. These standards are useful in making a survey of the adequacy of existing facilities. They should not, however, be used to limit or inhibit the development of new and better solutions in new construction.

Centralized controls may exist in statutes and state department regulations. The disadvantages of such controls are that they may be retained and enforced long after improved methods have been developed; that such enforcement may be arbitrary, rigid, and inhibiting; and that they often discourage a creative approach to problems. As rapidly as possible specific state codes should be replaced by or supplemented by a competent school-plant advisory service. However, only a few states today have the qualified education department staff specialists to render an effective service.

The greatest returns from state supervision would result from a service that provides manuals, guides, and consultant help, cooperates in local surveys, keeps the local officials technically informed, supplies in-service training for school planners, conducts research and experimentation, and reviews project proposals and plans.

Published standards and guides fall short of local requirements in several respects. They are necessarily general and cannot anticipate all local problems and conditions. They only partly satisfy local purposes or needs. They could in some respects impede a long-range solution in the urgency of satisfying immediate concepts, as in the case of square-footage standards for classrooms. At least the standards can be so applied that changes may be made economically in the

COMMUNITY FACTORS AND STANDARDS

The type of community not only determines the kind of educational program and appropriate educational standards for school facilities, but it also conditions the other standards which should be applied. The same standards for safety cannot be applied in congested cities which are appropriate for sparsely settled communities. The problems of temperature control vary with climate. Esthetics are a function of a particular environment. Structural standards are relative to such factors as weather, earthquakes, topography, and soil.

The study of the community cannot be too comprehensive in scope if it is to provide a sound basis for identifying needs for school facilities. Among the elements which are most necessary for study are the existing nonschool facilities which complement the work of the schools and which might be utilized more fully for school purposes or which might duplicate the work of the schools if not considered in assessing school-facility needs. These include recreation programs, parks, playgrounds, auditoriums, gymnasiums, museums, swimming pools, libraries, health services, social work programs, youth centers, camps, and similar facilities and programs. Not only should existing programs be analyzed, but future plans should be examined to determine their implications for the school program.

A standard which calls for single-story elementary school buildings upon a site of at least 20 acres would not be appropriate in every locality. The size of site really needed depends upon the use that actually will be made of the land, the availability of parks, playgrounds, and other public lands for school use, and many other factors. Whether one-story construction is the best solution depends upon the availability of land, the topography, the land values, the cost of clearing sites, the possibilities and probabilities of plant expansion, and similar factors.

The functions which schools should perform in any particular community are conditioned by a great many variables. These include the characteristics of the population, trends in the characteristics of population, the economy and economic trends, the extent to which youth take up residence in other communities, living standards and social conditions, the vigor and programs of other institutions, the functions assumed by other units of government, and special problems such as in-migration of minority groups.

Among community factors which have a direct bearing upon other appropriate school-building standards, the following should be studied: (1) weather and climate, with particular attention to temperature, cloudiness, wind, rainfall, and snow; (2) topography, soil, subsoil, earthquakes,

RELATED READINGS

Alexander, Carter, and A. J. Burke: *How to Locate Educational Information and Data*, Bureau of Publications, Teachers College, Columbia University, New York, 1958.
American Association of School Administrators: *American School Buildings*, Twenty-seventh Yearbook, Washington, 1949.
Beatty, W. W.: "What's Needed in Administrative Spaces?" *Nation's Schools*, 56:62–67, July, 1955.
Brown, Milton W.: *Standards for School Plant Construction Established by State Requirements*, University of Chicago Press, Chicago, 1946.
Burke, Arvid J.: "Development of State Responsibility for School and College Buildings," *The American School and University*, 18:41–46, 1946.
Bursch, Charles, Charles Gibson, and Henry L. Wright: "Classroom Size," *School Executive*, 68:58–59, January, 1949.
Caudill, William W.: *Space for Teaching*, Bulletin Series 59, vol. 12, no. 9, Engineering Experiment Station, A & M College of Texas, College Station, Tex., 1941.
———: An *Approach to Design of a High School*, no. 4, Caudill, Rowlett, Scott, and Associates, Bryan, Tex., 1954.
Darby, Francis C.: "Using Surveys to Improve School Lighting," *American School Board Journal*, 134:52–54, January, 1957.
Department of Education: *Guide for Schoolhouse Planning and Construction*, State of New Jersey, Trenton, N.J., 1952.
Donovan, John J.: *A Method of Procedure and Checking Schedule for Planning School Buildings and Their Equipment*, The Bruce Publishing Company, Milwaukee, 1932.
Engelhardt, N. L., and N. L. Engelhardt, Jr.: *Planning the Community School*, American Book Company, New York, 1940.
———, ———, and S. Leggett: *Planning Elementary School Buildings*, F. W. Dodge Corporation, New York, 1953.
———, ———, and ———: *Planning Secondary School Buildings*, Reinhold Publishing Corporation, New York, 1949.
Gibson, Charles D.: "Three Votes for Movable Casework," *Nation's Schools*, 58:70–73, September, 1956.
Holy, T. C., and W. E. Arnold: *Standards for the Evaluation of School Buildings*, Bureau of Educational Research, Ohio State University, Columbus, Ohio, 1936.
Illuminating Engineering Society: *American Standard Practice for School Lighting*, New York, 1948.
Leggett, Stanton: "Trends in Educational Space in Junior High Schools," *The American School and University*, 26:219–228, 1954.
Levin, Sol: *A Selected Bibliography of Business and Plant References for the School Administrator*, Bulletin no. 16, Association of School Business Officials, Kalamazoo, Mich., 1953.

future. For example, built-in features of special rooms and some classroom partitions may be so designed as to allow for later alteration of spaces.

Many basic needs and objectives of a community are met by other agencies than school districts. The school planners should in so far as practicable strive to have an integrated community solution, even if this means discarding some traditional school-building concepts and experimenting with new forms of space layout. School planners, while recognizing the goals of standards and their practical advantages, should seek to develop solutions indigenous to the long-range values of the community.

DISCUSSION PROBLEMS

1. Assume you are superintendent of a school district planning a building project and your school board feels that spending money for a survey is money wasted, what methods might you use to try to change their minds?

2. Renovation of an existing building usually has two stages, comprehensive inspection and specification writing. Describe a satisfactory arrangement for preparation of project specifications.

3. What is the relationship of the size of a school building, including such additions as may have been built after the original structure was erected, to the minimum size of school site that would allow for a satisfactory school program?

4. Show how the cost of modernization of the plant to acceptable standards can be spread on a pay-as-you-go plan over a period of years. What criteria then shall determine the priority of projects?

5. How may photographs be used to demonstrate the modernization requirements of the existing school plant?

6. May original concepts of the school plant be preserved in making plans for additions and changes in usage?

7. In what areas of the school-plant survey is more research needed to establish acceptable guides or standards?

8. Should educational specifications of the school-plant program ever exceed the available financial means and obtainable trained personnel?

9. Sketch the plan for a self-contained elementary school classroom. What size class should be assumed for each grade and why? Quote several research studies in support of the square-footage standards you accept.

10. Should adequate plans be made for the expansion of the gymnasium, cafeteria, library, auditorium, dressing rooms, and other special-purpose rooms (as well as service utilities) at the same time when plans for classroom expansion or addition are made?

11. Differentiate between the state-imposed standards for school building which you believe in the long run would be beneficial and those which you think might restrict efficient planning.

12. What survey information about the facilities of school districts should be secured before undertaking a program of state assistance for school building?

CHAPTER 7

Evaluation of Existing Plant

School-district property is an investment that should be conserved in the interest of economy. Usually the existing facilities constitute in large part a solution to the physical needs of present and future enrollment. Only under rare circumstances, where a school site is unsuitable, or the plant is totally obsolescent, or fire or other cause has destroyed the buildings, will the solution be a total new plant. Existing facilities are factual, serving more or less satisfactorily the present enrollments, while additions to the plant for future enrollments are necessarily based on estimates.

The question of how well existing facilities meet present needs may be technically evaluated in terms of modernization. The preliminary report of the National School Facilities Survey, based on information from twenty-five states, found that 40 per cent of all schools are unsatisfactory, 21 per cent of all pupils are housed in unsatisfactory school plants, 16 per cent of school buildings are over fifty years old, 45 per cent of classrooms have less than 21 square feet of space per pupil, 20 per cent of pupils are in unsafe buildings as to fire hazard, and a sizable proportion of children lack adequate water service and sanitary facilities. Such particular educational facilities as science rooms, shops, homemaking rooms, music rooms, art rooms, business education rooms, library, gymnasium, auditorium, cafeteria, and medical suite are not provided in anywhere from 14 per cent to 94 per cent of the secondary schools.

There exists a wide variety of local conditions from the one-room frame schoolhouse or temporary quarters on the one hand to massive multistory city school buildings and open country consolidated school campuses on the other. Therefore the subject in this chapter is treated from the standpoint of an average district, such as a small to medium-size city, accepting the fact that principles and illustrations given will have to be adapted to local requirements. Establishing the present usefulness

Monroe, W. S. (ed.): *Encyclopedia of Educational Research*, p. 1098 ff., "School Plant," The Macmillan Company, New York, 1950.

National Council on Schoolhouse Construction: *Guide for Planning School Plants*, Peabody College, Nashville, Tenn., 1958.

———: *Secondary School Plant Planning*, Peabody College, Nashville, Tenn., 1957.

———: *Elementary School Plant Planning*, Peabody College, Nashville, Tenn., 1958.

National Facilities Conference: *A Guide for Planning Facilities for Athletics, Recreation, Physical and Health Education*, American Association for Health, Physical Education and Recreation, National Education Association, Washington, 1947.

National Fire Protection Association: *Building Exits Code*, Boston, Mass., 1948.

National Recreation Association: *Standards for Neighborhood Recreation Areas and Facilities*, New York, 1944.

Odell, C. W.: *Standards for the Evaluation of Secondary School Buildings*, J. W. Edwards, Publisher, Inc., Ann Arbor, Mich., 1950.

Oregon State Department of Public Instruction: *Manual for School Building Construction*, Superintendent of Public Instruction, Salem, Ore., 1947.

Roach, S. F.: "School Boards and Municipal Building Codes," *American School Board Journal*, 135:82, October, 1957.

Sahlstrom, John W.: *Some Code Controls of School Building Construction in American Cities*, Bureau of Publications, Teachers College, Columbia University, New York, 1933.

Silverthorn, Harold: "Space Allocations for Elementary Schools," *Nation's Schools*, 53:66–71, June, 1954.

Strayer, George D., and N. L. Engelhardt: *Standards for Elementary School Buildings*, Bureau of Publications, Teachers College, Columbia University, New York, 1933.

U.S. Office of Education: *Designing Elementary Schools*, no. 1, Washington, 1953.

———: *The Secondary School Plant: An Approach for Planning Functional Facilities*, Washington, 1956.

West Virginia Council on Schoolhouse Construction: *Standards for Schoolhouse Construction*, State Department of Education, Charleston, W. Va., 1945.

Whitehead, Willis A., and others: *A Guide for Planning Elementary School Buildings*, Bureau of Educational Research, College of Education, Ohio State University, Columbus, Ohio, 1947.

atmosphere of the areas, the provision of special facilities, and the general efficiency of the plot and building plan.

Renovation and Modernization. It should be possible to produce a program of requirements for each school site that would overcome substandard conditions and ensure the preservation and long-term utilization of the school-plant values. Enough detail must be observed for making decisions on structural changes and mechanical replacements.

Orderly Adjustment to Eventual Master Plan. In addition to the above purposes the school-plant inspection should give information as to the relative significance of the observed conditions. Before the master plan can be adopted, a practical and orderly succession of steps or stages of construction must be formulated. For example, the work must be organized so as to have the least interference with regular school classes. Under some conditions the funds to do the work may necessarily become available over a period of years. The administrator asks: Are the fire exits safe? Could the furnace be made to go another year? Should we attach an addition or construct a separate building? Is this unit worth trying to modernize? Where shall we locate the cafeteria? Where can we hold classes during construction? Which alternative will be least expensive? The survey of existing plant will produce a variety of factual information for application in the master plan.

PRACTICAL PROCEDURES FOR THE SURVEY

A customary means of recording inspection of the existing physical plant is with a score card or rating form. Among such published school-plant-survey guides are the following:

George D. Strayer and N. L. Engelhardt, *Score Card for High School Buildings*, Bureau of Publications, Teachers College, Columbia University, New York, 1924.

George D. Strayer and N. L. Engelhardt, *Standards for Elementary School Buildings*, Bureau of Publications, Teachers College, Columbia University, New York, 1933.

N. L. Engelhardt, *Standards for Junior High School Buildings*, Bureau of Publications, Teachers College, Columbia University, New York, 1932.

N. L. Engelhardt, *Elementary School Building Score Card and Survey Manual*, Bureau of Publications, Teachers College, Columbia University, New York, 1936.

Haskel Pruett, *School Plant Requirements for Standardized Elementary and Accredited High Schools*, Peabody College, Nashville, Tenn., 1934.

E. S. Evenden, George D. Strayer, and N. L. Engelhardt, *Standards for College Buildings*, Bureau of Publications, Teachers College, Columbia University, New York, 1938.

and useful life of an existing school plant is a complex problem for which no simple mathematical formula can be devised. Yet the determination is factual and lends itself to objective, systematic fact-finding procedures.

One may determine by accepted standards whether the existing school plant is a safe and sanitary place for children or can reasonably be made so. One may rate the structural soundness of the buildings and all the mechanical installations. One may estimate the remaining durability of the structure or the economy of necessary modernization. However, final judgment as to integration of a given school unit within the total long-range program rests largely upon the probable efficiency of its utilization from an educational standpoint. Technical competence in making such evaluations has been improved by the contributions of school-plant research and published school surveys.

OBJECTIVES IN SURVEYING THE EXISTING PLANT

The engineering techniques which a school administrator chooses to apply in appraising the existing plant are governed by the ultimate use to be made of the information. He is seeking objective data that may be applied in specific ways.

Inventory of Available Spaces Usable for Specific Purposes. A record is required of all the available spaces, their location, condition, features, and present use. The record should be complete as to storage, utility areas, offices, furnishings, grounds, and surroundings. This record will be used to determine the total capacity of the existing plant. It will be the basis for planning utilization. It will reveal the facilities which are lacking. It will show where the present plant fits in the desired future program.

Structural Evaluation. The school district has a fundamental responsibility to provide a safe place for the persons to be served. This includes buildings, sites, transportation, and all the related features. The school-plant requirements extend to sanitation and comfort for the patrons. Among the standards to be observed are structural soundness, fire safety, water supply, waste disposal, accident prevention, illumination, temperature control, ventilation, supervision, care of health, custodial care, modern utilities, and institutional quality of mechanical features. The structural evaluation will help determine the existing plant's usefulness and capability of modernization. Also it will suggest possible adaptation of the structural plan to alterations or additions.

Educational Values. The functional usefulness and quality of the learning environment may be appraised by application of school-plant standards. The inspection begins with the school site and its environs and includes a room by room analysis of the buildings. Particular attention should be given the facilities for teaching, the convenience and learning

buildings. But for the older buildings and additions the architect's blueprints are often incomplete, antiquated, or not available. The blueprints are valuable for planning structural changes and for receiving cost estimates. They are not very satisfactory in their original form for the purposes of the preliminary school-plant survey. They do not have uniform dimensioning; they often are too complicated, cumbersome to handle, and unsuited for writing in the desired notations.

What the school-plant surveyor needs are simplified sketches containing current information that can be easily duplicated and placed in a building-inspection report. No exceptional skill is required to make such simplified floor-plan sketches. A draftsman from the school architect's office may be loaned for the purpose, or someone on the school staff can do a satisfactory job. Most of the floor-plan dimensions may be found in the architect's blueprints, but some measurements and data will have to be secured by inspection. The draftsman should be instructed to indicate fenestration and doors, dimensions of rooms, width of passageways, and in some instances the ceiling height.

It is well to standardize the size and form of these sketch drawings. The size may be 20 by 14 inches. The drawings should be prepared for duplication in about six copies. Brownprints are easier to write upon. One sketch should show plot plan, orientation, and environs. Other sketches should be prepared for each floor of the building. Preferably the plans should be of uniform scale, as 1/16 inch equals 1 foot, and be fully labeled. The draftsman assigned to prepare the simplified floor-plan and plot-plan sketches may be given the following instructions with modifications to suit local conditions.

CHECK LIST OF INSTRUCTIONS FOR SIMPLIFIED SKETCHES

Prepare simplified sketch drawings for plot plan including environs and for each floor of the buildings. Fully labeled, size 20 by 14 inches, scale 1/16 inch equals 1 foot, for reproduction. Details to be observed:

1. Administrative spaces: (*a*) General office, principal's office and toilet, size, floor, wall and ceiling finish, vault; (*b*) medical clinic, use as nurse's room, doctor's office, medical suite, facilities, toilet, wash basin; (*c*) teachers' rest room, size, lunch facilities, toilets in conjunction.

2. Classrooms: Size, number of seatings, floor, wall and ceiling finish, closets, wardrobes, installations.

3. Auditorium or assembly: Stage or platform, number and type of seatings, related spaces, floor, wall and ceiling finish, size.

4. Gymnasium: Coed or separated, size, floor, wall and ceiling finish, ceiling height, equipment, toilets, showers, lockers, ventilation, storage, related spaces.

5. Cafeteria or lunch: (*a*) Pupils, kitchen or improvised food-preparation space, dining area enclosed or open, floor, wall and ceiling finish, storage, plat-

Merle A. Stoneman and Knute O. Broady, *Building Standards for Small Schools*, University of Nebraska Press, 1939.
T. C. Holy and W. E. Arnold, *Score Card for the Evaluation of Junior and Senior High-school Buildings*, Ohio State University Press, 1936.
T. C. Holy and W. E. Arnold, *Standards for the Evaluation of School Buildings*, Ohio State University Press, 1936.
C. W. Odell, *Standards for the Evaluation of Secondary School Buildings*, Edwards Bros., Inc., Ann Arbor, Mich., 1950.
Jack L. Landes and Merle R. Sumption, *Citizens Workbook for Evaluating School Buildings*, William C. Brown & Co., Dubuque, Iowa, 1951.
Henry H. Linn and Felix J. McCormick, *School Plant Rating Form*, Bureau of Publications, Teachers College, Columbia University, New York, 1956.

The Landes-Sumption workbook is arranged as a check list with the accompanying standards organized under the following functional aspects of the physical plant: adequacy, suitability, safety, healthfulness, accessibility, flexibility, efficiency, economy, expansibility, and appearance. For leadership with a lay group wishing to investigate building conditions and implications for educational planning, this approach is a challenge. Functional categories are especially meaningful in reporting the survey findings to the public.

School-building surveyors have been inclined to score the physical *characteristics* of the school plant, namely, the structure, ventilation, illumination, instructional space, storage, location, etc. In a large school district the practical circumstances of building inspection are such that the building surveyor has to score two or three buildings in a day and record his observations on the spot as he proceeds through each building. He needs a brief and handy record form of four or five pages that will be suited to his immediate purposes. Interpretation of his recorded observations in relation to educational principles or in response to critical questions can be done later.

Preparation of Floor-plan Sketches. Clear and complete sketches of the floor plans of existing buildings are useful in many ways during a school-building program. They are especially valuable as part of the survey of physical conditions of the plant. They supplement itinerate inspections with a permanent record of dimensions and specific features by areas of the building. They assist the surveyor to avoid overlooking essential details when he prepares his consolidated report of observations. One may ask whether floor-plan sketches should be prepared for all buildings, how much skill is required to make practical sketches, and what ought to be their form and content.

The architect's final blueprints of present school buildings presumably are filed as an essential property record. Ordinarily such blueprints, containing all revisions, are available for the more recently constructed

For over a quarter of a century city schools have been scored and compared on a point scale of values—usually by the Strayer-Engelhardt 1,000-point scale. Since the scores of numerous school buildings are already recorded in published reports of school-building surveys for large and small city school systems, it seems desirable by way of comparison to continue using the value point system. Therefore the possible maximum score of each major building feature in the survey record form has been correlated with the Strayer-Engelhardt system.

Engelhardt and Engelhardt's[2] school-plant-survey experience, based upon application of the value point system:

> . . . suggests that a score of 900–1000 indicates a highly satisfactory degree of construction and equipment. In fact, in only a few minor respects does such a building deviate from acceptable standards. A rating between 700 and 900 points is satisfactory. It should be studied in the light of its component parts. . . . A score of 600 to 700 points has meant, as experience in these surveys points out, that considerable alteration was needed before buildings could be brought to a satisfactory standard of efficiency. Buildings that have scored 500 to 600 points have proven to be unsatisfactory and yet not so far gone but that extensive repairs and replacements could make them reasonably habitable. When the scores of buildings have fallen below 400 points, it has been the universal judgment of those who have applied the score card that speedy abandonment of the building for school purposes was the only justifiable course to be followed.

Standards for each item of the *School Plant Survey Record* were discussed in Chapter 6. A separate and complete rating of the site should be secured from a school-site-factor profile in a separate study, as will be described in Chapter 11.

In general the maximum score on any item typifies the *average of better schools* in the country. A half score typifies the average condition found in schools. The scores are not broken down into detailed object classification since chief reliance for screening the existing school plant is placed on a school-plant-factor profile. The profile reveals at a glance, for the purposes of criteria enumerated in this chapter, the standing of any building on its major factors (Figure 7-1). Conceivably a building of unsound structure that must be abandoned could score above 400 points, but the essential defectiveness of such a biulding would be at once apparent on the profile. Conversely a building of high structural soundness conceivably could be so rehabilitated as to provide safety, sanitation, and educational adequacy at far less cost than for a total replacement.

[2] N. L. Engelhardt and Fred Englehardt, *Planning School Building Programs*, Bureau of Publications, Teachers College, Columbia University, New York, 1930, pp. 307–308.

forms; (*b*) teachers, adjacent to pupils' kitchen for service or lunch service in teachers' rest room. (Note miltipurpose installations.)

6. Specialized classrooms (science laboratories, music rooms, shops, etc.): Size, specific use, number of seatings, bench stations, floor, wall and ceiling finish, equipment, ramps, closets, wardrobes.

7. Playrooms: Size, ceiling height, floor, wall and ceiling finish, ventilation, light.

8. Playgrounds: Interior or exterior courts, pavement, fences, parking areas, equipment, special lighting, walks, spectator areas, equipment, storage.

9. Library: Size, capacity, furniture and shelves, equipment, related areas.

10. Kindergarten: Size, capacity, floor, wall and ceiling finish, special toilets, and drinking fountains.

11. Plant operation and custodial service: Comment on (*a*) boiler room, (*b*) fuel-storage space, (*c*) custodian's workshop, (*d*) general supply rooms, (*e*) supply rooms for flammable materials, (*f*) custodian's closets throughout the building, (g) head custodian's office, toilet, and shower, (*h*) ventilation spaces, (*i*) air-conditioning equipment, (*j*) all storage rooms, (*k*) incinerator.

12. Toilets: Indicate boys, girls, men, women throughout the building, including rest rooms off half landings of stairs, equipment, ventilation, floor, wall and ceiling finish.

13. Drinking fountains; Note in playrooms, corridors, and throughout building.

14. Exits: Note exit number, steps, panic bolts, padlocked doors, fire escapes.

15. Stairs: Stair number, material of enclosure, material of treads and risers, type of doors, indicate up or down directions, stairs to roof. (Fire resistance rating of stairwells.)

16. Roof: Comment on the type, finish, and condition of roof; roof skylights and court skylights; attic spaces; sloping ceilings of rooms.

17. Corridors: Width, floor, wall and ceiling finish; note wainscots and transoms or other sources of natural light.

School-plant Inspection Record and Score Form. The format of the *School Plant Survey Record*,[1] exhibited in Figure 7-1, has been designed primarily for essential brevity of note taking while inspecting a building unit from attic to basement. The viewpoints of architect, engineer, and educator are distinguished. Space is allowed both for general observations and for specific memoranda in each category. The inspection record gives factual evidence to support the school-plant profile displayed on the first page of the form. Brief factual notations should be written in the inspection record immediately before the observer's memory is confused by later impressions. Such a school-plant inspection assumes that the building surveyor is thoroughly familiar with locally accepted standards and expert in applying educational principles to features of the physical plant.

[1] Obtainable from Administrative Education Department, College of Education, University of Houston, Houston, Tex.

INSPECTION RECORD OF SCHOOL PLANT IN RELATION TO BUILDING STANDARDS

(This record is basis for school plant factor profile.)

Item	Comment	Score
Structural Features (Estimated durability,____years.)	Value 180	
1.1 Building Structure (100)		
1.11 Condition of Structure		
(a) Foundations		
(b) Exterior Walls		
(c) Windows		
(d) Roof		
(e) Floor Structure		
(f) Interior Walls		
(g) Ceilings		
1.12 Plan Type*		
1.13 Appearance		
1.2 Safety and Circulation (80)		
1.21 Type and Condition of Stairs and Stairwells		
1.22 Location of Stairs*		
1.23 Corridor Width and Location*		
1.24 Condition of Corridors		
1.25 Number and Location of Exits*		
1.26 Fire and Panic Protection		
1.27 General Safety		
Mechanical Features	Value 140	
2.1 Heating and Ventilation (40)		
2.11 Type and Condition of Heating Plant		
2.12 Type and Condition of Heating System		
2.13 Heating Efficiency		
2.14 Boiler Room Layout*		
2.15 Type and Condition of Ventilation		
2.16 Controls		
2.17 Air Conditioning		
2.2 Plumbing Facilities (40)		
2.21 Toilet Room Adequacy*		
2.22 Toilet Room Conditions		
2.23 Water Facilities		
2.24 Drinking Fountains*		
2.25 Individual Room Installations		
2.26 Showers and Special Equipment		
2.3 Electrical Services (30)		
2.31 Power Installation and Control		
2.32 Communication and Signal System		
2.33 Alarms and Exit Lights		
2.34 Special Room Installations		
2.35 General Room Installations		
2.36 Electrical Safety		
2.4 Illumination (30)		
2.41 Number and Type of Fixtures		
2.42 Quantity of Illumination		
2.43 Quality of Illumination		
2.44 Controls		
2.45 Effect (brightness balance)		

*Consult attached floor plan sketches.

Fig. 7-1. Inspection record and score form used to evaluate existing facilities.

The University of Houston
Department of Administrative Education

Date____________________
Surveyor____________________

SCHOOL PLANT SURVEY RECORD

Name and Type of School______________________________________
Address____________________________ Principal______________
Date Erected________ Date of Additions________ Addition Sizes__________
Number of Floors____ Structure Type____________ Roof Type__________
Insurable Value $_______ Site Area______acres Site Value $__________
Capacity: Operational_______ Emergency________ Total Pupil Stations________
Grades Housed________ Current Enrollment_____ Utilization Ratio_________

Educational Spaces

No.		No.	
___	Classrooms	___	Science
___	Kindergarten	___	Music
___	Administration	___	Art and Crafts
___	Library	___	Business
___	Auditorium	___	Shops
___	Gymnasium	___	Homemaking
___	Cafeteria	___	Guidance
___	Multipurpose	___	Student Activities
___	Health	___	__________
___	Faculty	___	__________
___	__________	___	__________
___	__________		
___	Separate Buildings		

Enrollment Study

Current (Date:_______)		Trend September	
Kdg.	______	19__	________
1	______	19__	________
2	______	19__	________
3	______	19__	________
4	______	19__	________
5	______	19__	________
6	______	19__	________
7	______	19__	________
8	______		
9	______	(Projected)	
10	______	19__	________
11	______	19__	________
12	______	19__	________
Other	______	19__	________

SCHOOL PLANT FACTOR PROFILE
(0 to 10)

		0	1	2	3	4	5	6	7	8	9	10	Score
Structural	1.1 Building Structure												180
	1.2 Safety and Circulation												
Mechanical	2.1 Heating and Ventilation												140
	2.2 Plumbing Facilities												
	2.3 Electrical Services												
	2.4 Illumination												
Educational	3.1 Classrooms												550
	3.2 Special Rooms												
	3.3 General Areas												
	3.4 Administration Rooms												
	3.5 Efficiency												
Site	4.1 Site Adequacy												130
										Total Score			1000

Recommendations:____
____

Educational Features (continued)	Score
3.5 Efficiency (150)	
3.51 Suitability for Educational Program	
3.52 Flexibility	
3.53 Economy of Effort	
3.54 General Storage	
3.55 Custodial Facilities	
3.56	
3.57	
Site Adequacy (For details refer to school site score card.)	
4.1 Site Value 130	
4.11 Location	
4.12 Size*	
4.13 Playfields*	
(a) Size and Shape	
(b) Location on Plot	
(c) Surfacing and Drainage	
(d) Equipment	
(e) Safety	
(f) Suitability	
4.14 Traffic and Parking	
4.15 Landscoping	
4.16 Condition of Walks, Fences, etc.	
4.17 Neighborhood	
Value 1000 Total Score:	

Summary of Substandard Conditions:

The educational adequacy of the plant can be viewed in this plant-survey form by areas, classrooms, special rooms, general rooms, and administrative rooms; also the efficiency of the over-all relationship of component parts can be rated. The frequent question of partition changes, renovation, and building additions justifies this form of rating. Furthermore, it is not uncommon to have one or another of the building areas excel because of recent modernization; while on the other hand, some educational spaces may be found very inadequate or absent.

Building standards have been published by reputable authorities, such as those listed in the reference readings of this and the preceding chapters. These standards cover numerous particulars not specifically mentioned in a brief form of school-plant-survey record. The surveyor has to bear all points of the standards in mind and look for each and every detail during his inspection. Only the significant facts are recorded, but all

Educational Features: Inspection of Areas

Value 550

Factor Weighting:	30%	10%	15%	15%			30%				(100%)
Spaces	Size and Shape*	Location*	Walls and Floors (Appearance and Utility)	Furniture and Equipment	Storage	Heating	Lighting	Ventilation	Acoustics	Lockers	Score
3.1 Classrooms* (150) (by groups)											
______											
______											
______											
______											
3.2 Special Rooms* (70)											
3.21 Music ______											
3.22 Arts and Crafts ______											
3.23 Shops ______											
3.24 Homemaking ______											
3.25 Science ______											
3.26 Business ______											
3.27 Kindergarten ______											
3.28 Student Activity ______											
3.29 ______											
3.3 General Areas* (140)											
3.31 Auditorium or Assembly ______											
3.32 Gymnasium or Multipurpose Room ______											
3.33 Library and Resource Center ______											
3.34 Cafeteria and Food Service ______											
3.35 Corridors and Foyers ______											
3.36 Reception and Conference ______											
3.37 ______											
3.4 Administration Rooms* (40)											
3.41 General Offices ______											
3.42 Principal's Office ______											
3.43 Special Offices ______											
3.44 Health Clinic ______											
3.45 Faculty Rooms ______											

14. Emergency exits improperly marked or lighted
15. Lack of self-closing fire doors on boiler-room exit
16. Classroom doors that can be locked against egress
17. Fire escapes of unsafe design, improperly maintained, or poorly located
18. Fire escapes passing by unprotected window areas
19. Inadequate fire-alarm signals
20. Lack of fire-resistive boiler rooms
21. Storage space or closets under stairs
22. Unused duct work that might carry fire, fumes, or gases throughout the buildings

Heating and ventilation

1. Heating plant of insufficient capacity to heat adequately all areas of the building
2. Obsolete or worn-out heating plant
3. Deteriorated or worn-out fire or water tubes in boilers
4. Cracked sections in cast-iron boilers
5. Deterioration of bridge or lining in furnace
6. Leaking flues in heating plant
7. Inefficient or nonexistent automatic temperature controls throughout the building
8. Air leaks in chimneys, breeching, or boiler walls
9. Excessively broken insulation around heating unit and pipes
10. Sagging water or steam lines
11. Poor circulation of heating medium (air, steam, or water)
12. Impractical boiler-room layout that restricts maintenance of heating unit or handling of fuel and ashes
13. Poor or nonexistent mechanical ventilation for toilet rooms

Plumbing and electrical services

1. Inadequate general water supply
2. Inadequate supply of safe drinking water
3. Lavatories providing only cold water
4. Inadequate supply of hot water for showers
5. Toilet facilities located only in the basement
6. Toilet facilities located only outside of main buildings
7. Toilet-room floors which are cracked, pitted, or badly worn
8. Toilet-room floors which are not impervious to moisture and odors
9. Toilet-room walls, partitions, or ceilings which are deteriorated, cracked, or poorly maintained
10. Illumination in toilet rooms less than 5 foot-candles
11. Lack of adequate toilet facilities for public use adjacent to large group areas such as gymnasium, auditorium, or cafeteria, if these are present in the building
12. Obsolescent plumbing, fixtures, or fixtures that are cracked, crazed, or otherwise defective

features, good and poor, are evaluated in the surveyor's judgment on each and every item of the survey record.

Supplementary Check List. It is often desirable to supplement the inspection record with a schedule of needed repairs and renovation. A check list of common deficiencies such as the following is a useful addition to the *School Plant Survey Record* for recapitulating the substandard items observed.

CHECK LIST OF SUBSTANDARD CHARACTERISTICS

Mark (X) any of the following common defects observed; mark (P) if partial.

Structural

1. Leaking foundations causing damp, unhealthful basement areas
2. Building settling causing serious bearing wall cracks
3. Walls tilting out of plumb
4. Air or water leakage around windows or doors
5. Water seepage through deteriorated pointing on walls
6. Unsafe parapet walls
7. Loose or leaking coping on parapets
8. Improper or deteriorated flashing on roof
9. Leaking roofs caused by missing shingles, torn or deteriorated roofing materials
10. Rafter or joist sag causing pockets in roof
11. Leaking gutters or choked or broken downspouts
12. Improperly maintained or unsafe steeples, domes, belfries, dormers, or skylights
13. Interior wall and ceiling material, cracked, stained, or broken
14. Fixed interior bearing walls which restrict flexibility of instructional areas
15. Building not readily expandable because of design, terrain, or site size

Safety and circulation

1. Multistory buildings of nonfire-resistive construction
1. Nonfire-resistive open stairwells
3. Unsafe combustible stairs enclosed in stairwells
4. Stair runs in excess of sixteen risers
5. Badly worn or cupped stair treads
6. Stair winders used by pupils
7. Two or more stairs with common landing
8. Unsafe combustible corridors
9. Corridors of inadequate width
10. Corridors of unsafe design
11. Too few or improperly located exits
12. Exit doors swinging into building
13. Exit doors not equipped with suitable panic hardware

achieve a composite rating of existing buildings. The problem of obtaining uniform and comparable data was overcome by issuing explicit instructions and a factual check list to the several city building inspectors. They were told to state specifically what replacement and what repair was needed, as follows:

1. On exterior structure, the foundation, exterior walls, window frames and sash, roof, skylights, exterior stairs and steps, fences and retaining walls, walks, and pavements
2. On heating and ventilation, the boiler units, automatic temperature controls, machinery and pumps, ventilating system, sprinkler system, radiators, supply and return lines, and forced draft system
3. On electrical, the service lines, switchboard, circuit wiring, conduit, lighting fixtures, fire-alarm system, public address system, and intercommunication system
4. On plumbing and draining, the water supply from street, hot and cold water supply, roof water tanks, pumps and machinery, plumbing facilities in educational spaces, slop sinks, roof drains, leaders, gutters, yard drains, student toilet fixtures, teacher toilets, drinking fountains, sewage disposal, gas lines, and water pressure

Obviously all this information is very practical, but it is exceedingly difficult to make use of such reports in evaluating the building units. What one needs is a sense of condition and relationship that can be acquired most directly by an experienced surveyor upon a rather brief but comprehensive inspection of the entire building or plant. While the competencies of the architect, engineer, and educator all are necessary for a sound judgment, it is essential that all parties collaborating on the school-plant-survey record understand, believe in, and abide by an agreed set of building standards. The parties ought to study together the accepted standards and settle their differences in terms of the standards. Of course, the experienced school-building surveyor has the advantage here of having matched recognized standards against a wide variety of different building conditions.

Standards for Inspected Items. A short summary of salient features to be found in modern school-building standards was presented in the preceding chapter. The local school district should adopt its own local standards on several items, especially those having to do with space standards, which are somewhat controversial. The community may desire an educational program more advanced than the commonly published minimum standards. If the comparative degree of substandardness is the primary objective sought by a school-plant-rating device, there will be little justification for having a different set of standards for the existing plant than would be acceptable in new construction (see Figure 7-2).

13. Lack of properly located custodial work sinks on each floor level
14. Inadequate or defective sewage-disposal facilities
15. Hazardous old-fashioned knob and tube electric wiring
16. Electrical circuits of too small capacity to carry safely present and future required loads
17. Too few or poorly located lighting fixtures in spaces other than classrooms
18. Too few or poorly located electrical outlets (base plugs)
19. Pull cords or lack of multiple light-control switches

School site

1. Site size below recommended minimum standards
2. Inadequate outdoor play spaces
3. Lack of adjoining space for needed expansion
4. Lack of adequate parking or bus-loading facilities
5. Terrain restricting use or development of the site
6. Site location away from school-population centers
7. Site location in industrial or other undesirable area, such as near traffic and other hazards

COMPETENCE OF EVALUATORS

Where a school system undertakes to conduct a large-scale survey of its school plant, it should provide for three types of technical competence, that of the architect, the engineer, and the educator. The architect will observe some factors that an educator may undervalue; and the educator will look upon the plant in a different light than the lay technician. A team of three persons produces a more valid and dependable report than any one of them could make individually.

The application of this principle will have to follow practical lines according to circumstances. Some cities employ building inspectors who possess good engineering judgment. And in a very small school district the architect may have to double as engineer in the team. When educational consultants make the physical-plant survey, they usually invite the chief custodian and building principal to join in the inspection tour. The proposed school-plant-survey record assumes a tripartite inspection—structural, mechanical, and educational. If the three specialists are available to make the inspection, it is considered best for them to work together as a team, each taking notes on all or practically all of the items on the record form, and then to confer and agree upon a profile rating of the several school-plant factors. If only one expert makes the inspection, he should seek counsel from other specialists who are in a position to know and evaluate the school unit.

In a pilot study conducted in New York City in 1951 the New York State Commission on School Buildings used school administrative officers, a city architect, and building inspectors according to trade in order to

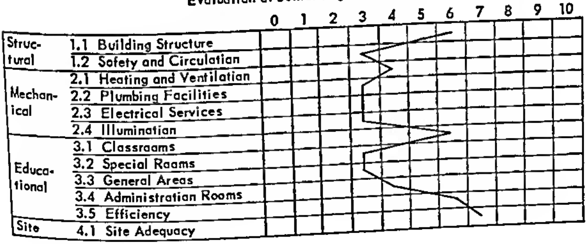
Capacity

Assuming the building is to be used as a classroom unit, it has pupil station capacity of about 300.

Requirements

1. Extensive repairs and renovation of classroom and corridor walls, ceilings, floors.
2. Installing modern tile or terrazzo lavatories with fixtures to accommodate 300 pupils (according to N.C.S.C. standards).
3. Overcoming sun glare with outside venetian shades.
4. Providing for acoustical control throughout the building. Lowering the corridor ceilings and treating them with sound-deadening material would assist.
5. Reflooring the corridors, keeping in mind the desired acoustical results.
6. Enlarging and renovating the gymnasium dressing rooms. The standards of sanitation in showers and dressing rooms should be comparable to those in modern homes.
7. Converting the old gymnasium wing to its assigned purpose; furnishing and installing forced ventilation (or preferably air conditioning in this instance).
8. Providing chalkboards and bulletin boards for each classroom, and storage cabinets where needed.
9. Modernizing the illumination, including electric wiring.
10. Refurnishing special rooms and rehabilitating furniture.
11. Repairing roof and masonry.
12. Repairing and making replacements in the heating system.
13. Installing exit lights and signs.
14. Redecorating the classrooms in selected color harmony.
15. Repairing the lockers.
16. Linking together the buildings and rooms of the campus by a central communications system (telephone or public-address type).

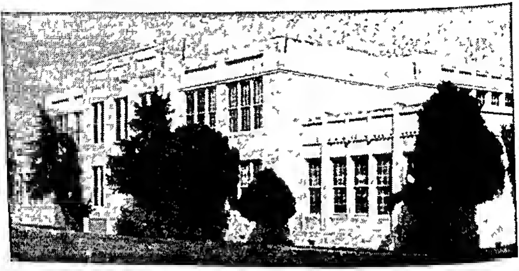
Evaluation of Junior High School



School Plant Score: 600

Fig. 7-2. A technique of reporting the evaluation of existing facilities shown in specimen pages from a survey report. (*School Building Requirements of Angleton Independent School District, Board of Education, Angleton, Tex.,* 1956.)

JUNIOR HIGH SCHOOL BUILDING



The junior high school and its portion of the site were evaluated separately from the high school facilities, although both departments are located on the same 11.5-acre campus. Both sets of buildings are shown on the floor-plan sketch in their approximate relationship to each other.

Physical Facilities of the Junior High School Building

This two-story masonry building erected in 1910 has a pleasing appearance on the outside, but except for the gymnasium wing of later construction, it is in considerable disrepair and requires complete rehabilitation. The building has twelve classrooms of assorted size, a library alcove, an administrative office, a teachers' lounge, a gymnasium, and in another wing, an older small gymnasium requiring renovation. The latter area could be reconstructed and furnished on architect's specifications to serve as a central cafeteria for the campus and also as a social and multipurpose center.

The building appears structurally sound and can continue as a secondary school unit. It needs numerous repairs and redecoration. Much of the floor has to be replaced. Windows are wood frame, and some are in poor condition. Ceilings and walls need repairs. The teaching facilities in some classrooms are inadequate. The lavatories are very bad. The furniture is substandard, much of it requires renovation or replacement. General storage is fair. Some masonry and roof repairs are indicated.

The most troublesome feature of this building is the bad acoustics. The distraction wears on the nerves of the children who are trying to attend to their lessons, and it reduces teaching effectiveness far below the optimum, even to the point of interrupting discussions and preventing economical operation. Whatever is done with floors, corridors, ceilings, and alteration of partitions, it should be kept in mind that this building will remain unsatisfactory until the noise factor is remedied. A part of the difficulty is due to overcrowding.

The gymnasium has good area and spectator space. The dressing rooms beneath the gymnasium are inadequate in size to serve the 600-pupil enrollment. Also, at present they are unsanitary.

4. What is the possible utilization of the structure now and in the future? The functional features, the departments, and the capacities show the role of the existing plant in the master plan, and its relative efficiency.
5. What is the degree of modernization? A factual determination must be made in the following respects:
   a. The extent of substandard conditions in terms of what the community expects its schools to be
   b. The estimated cost of modernization, which usually is not justified if it *exceeds 50 per cent of replacement cost*
   c. The proposed schedule of modernization, which involves housing the pupils during the period of renovation
   d. The opportunity to attain adequacy after proposed renovation is accomplished, with reference to (1) the necessary residual substandardness that the district will accept as normative, (2) the economy of retaining the building as part of a long-term educational program, and (3) the problem of expansibility or flexibility
6. What should be the length of investment? Final judgment must be made in the light of all relevant facts as to the value of the existing plant in relation to the ultimate plan and the strength of argument for abandonment.

An objective inspection of the physical plant and its environs having produced some of the required factual information, as is evident from the foregoing criteria, these recorded data have then to be correlated with other phases of the total survey of school-building requirements before final recommendations as to disposition of the existing plant can be formulated and before proposals can be made on the order of expenditure in the long-range capital program.

Orderly Process of Modernization. An orderly way to screen the existing school plant is to establish a policy on each of the basic criteria for appraisal, as mentioned above, and to examine the facts about a particular building with respect to adopted policies. For example, one may establish as a matter of fact (1) the level of standards that the community expects and is able to support, (2) the structural worth and utility of the existing plant, (3) the adequacy of the site in respect to the long-range program, (4) the need for the building according to enrollment and facilities, (5) the cost and relative economy of modernization for continued use, and (6) the relation of available spaces to the long-range need for space.

Priority in Screening. Where a school district has several building units of various conditions, or even a single building with various substandard features, the relative significance of modernization requirements must be established among the units.

The continued use of existing plant, even after modernization, is an

APPLICATIONS OF SURVEY DATA

The several alternatives on disposition of existing plant will need to be evaluated in the light of all the evidence, including the above inspection report that has scored the general substandardness. Final determination as to disposal of existing school plant is a key element in any long-range plan for school-plant maintenance.

Among the possible decisions on disposition of existing plant are these:

1. To accept the existing building without major outlay other than for normal upkeep and to continue its present use indefinitely

2. To change the educational usage of the building in part or in whole and prepare construction plans for indicated alterations, including educational specifications on modernization and rearrangement of spaces, as is often necessary where additions are to be built

3. To continue the present usage indefinitely without change but prepare plans and specifications for permanent modernization and renovation, which may be extensive or limited in scope and carried out at once or in successive stages over a period of time

4. To expend a reasonable sum for most urgent modernization as a temporary expedient with a view to early abandonment or change of usage after an anticipated peak enrollment has passed

5. To abandon and dispose of the building in the most profitable way either immediately or as soon as suitable replacement program can be completed

While these are the more common solutions, there are any number of special conditions that may exist, as in the case of leased quarters, classroom units that are part of housing developments, high land values in built-up sections of large cities, migratory population, inability to predict population trend, new procedures in city school transportation, consolidation of districts, and so on.

Criticol Questions to Be Answered. The school-plant inspection record should yield specific information, answering at least in part the following basic questions:

1. Is the facility needed? The potential use to which the school-plant unit may be put over a period of years and the pupils available show the need for a particular building at the particular location.
2. Is the site suitable? An appraisal of the site as to its location, characteristics, and place in the master plan shows whether the site itself may be or become obsolescent.
3. Is the plant structurally sound or can it be made so? The plant inspection shows the safety, economy of operation and maintenance, capability of renovation or modernization, and expected useful life of the building.

tax-base restrictions, schedule of prior indebtedness, state-aid regulations, fiscal dependence, methods of tax levy, and the like. State laws sometimes restrict how the available funds can be expended. The school district has to consider both immediate responsibilities and leeway for predictable emerging school-plant needs such as high school expansion in future years. The availability of funds is one of the major controlling factors in all planning.

To a considerable extent, the decisions on immediate treatment of existing school plant must seek to protect the school district against possible error of estimates made in the survey of building requirements. Temporary and substandard buildings are often continued in use while awaiting more certain evidence on the trend of child population and boundary changes. Inbred caution has been a major source of saving in school-plant development.

The time required for contractor's work is a factor in planning renovation of existing plant. Seldom can very extensive work be completed during vacations; and often nine to twelve months of interruption in the normal school operations must be expected. The scope and scheduling of all modernization proposals must be adjusted to the practical solutions that can be found to this question. This is illustrated where numerous small units must be abandoned in order to bring the children together at a central campus, when rural one-room school districts have been consolidated.

The relative economy of abandonment has been advanced by some theorists as reason for constructing new school buildings to last not more than twenty, thirty, or fifty years. Several factors contradict this contention. In the first place with good maintenance any structural type of school building would stand a hundred years, and too cheap construction may foist educational slum conditions on future generations. Temporary schoolhousing is justified by temporary community housing, but not because of the normal evolution in educational methodology. The investment in temporary school buildings is wasteful if spending a little more would produce a durable quality of materials, fixtures, and equipment. The better solution is to use modern, low-cost construction methods on a comprehensive plan that would encourage flexibility and expansibility for adjustment to changing needs. Obviously the old-style monumental structures do not lend themselves to economical modernization, adjustment of spaces, upkeep, or indeed economical operation.

A special case for abandonment could overweigh all other considerations. Perhaps a school building found to be seriously substandard can be disposed of at a profit, or possibly it will be in urgent demand for other than school purposes. The expediency of seeking a different location may be conclusive. Continued use of an existing substandard plant

almost inevitable compromise with an ideal functional layout. Some allowance has to be made for the evolutionary nature of educational programs and community desires. On certain standards as to safety, sanitation, and healthfulness, the administration should be uncompromising. On others, like size and shape of spaces, efficiency of respective location of spaces, convenience of facilities, esthetic appearance, and the like, the school board may accept as normative some degree of difference from the ideal standards it might require in a new school plant.

The disposition of existing plant will be affected by community attitudes. A decision often must be made as to whether the secondary schools or the elementary grades shall be favored with new buildings. Cities are often under pressure to take care of the needs of one ward or neighborhood ahead of another. Sometimes mixed population attitudes lead to special decisions on use and modernization of existing plant. To maintain an equitable treatment of educational needs under these circumstances is admittedly difficult, but fair decisions ought to result from adherence to uniform policies and factual evidence. By treating the appraisal of existing school plant as an engineering, fact-gathering process, the resulting plan of action should follow objectively and reasonably from the application of impartial policies.

Across-the-board Improvement. The school district has a choice between totally rehabilitating and modernizing each building unit as a whole or making across-the-board improvements in selected items concerning which they feel very strongly. Illustration of the latter approach would be to bring all building units up to standard on any one or more of the following characteristics: illumination and electric power, fire exits and protection, toilet facilities and drinking fountains, air conditioning (temperature, ventilation, etc.), landscaping grounds and exterior appearance, adequate playgrounds and equipment, minimum pupil-station area, modern furniture, cafeteria service, health clinic, and certain special rooms or departments.

If a standard, such as health, safety, or sanitation, deserves very high priority, the tendency is to make across-the-board improvements in order that no child may suffer because of delay. On the other hand, modernization of a total building unit is often more economical and gives a more satisfactory finished product. Unit modernization is almost always preferred where the long-range program calls for a substantial change in the purpose for which a unit is to be utilized.

Practical Considerations. There are some practical conditions that have to be recognized and met before any final decision is reached. Whatever is done will probably be limited in one way or another by the funds available. The district may have more potential ability than it can realize at any given time because of debt-limitation laws, tax-rate limitation,

Fig. 7-3. An orderly procedure for solicitation of bids on modernization projects and purchase of furniture or equipment. (*J. B. Hayford, "Solicitation of Bids," School Business Affairs, vol. 21, no. 11, November, 1955.*)

(D.P. SA)

SOLICITATION OF BIDS

BID NO. D.P.
DATE

BDARD DF EDUCATION
City of Chicago
BUREAU DF PURCHASES
Room 430, 228 N. LaSalle Street
Telephone DEarborn 2-7500

(THIS IS NOT AN ORDER)

SUBMISSION OF PROPOSALS ANO CLOSING DATE: Sealed proposals will be received in the Office of the Secretary, Room 810, 228 N. LaSalle Street, Chicago, Illinois, up to 12:00 o'clock noon on Monday, and will be publicly opened and read aloud (if requested) immediately thereafter in the Board Room, Room 305.

IN CASE OF NO-BIO: If you are unable to quote prices on this proposal, please so state on this proposal form and return it so that the Board may know that you have had an opportunity to quote and that you will welcome receipt of similar proposals in the future.

CONDITIONS: On the reverse side of this sheet are recorded several statements of conditions which apply specifically to, and shall be considered as a part of, this solicitation of bids.

BUYER | COMMOOITY NO.(s) | REQUISITION NO.(s)

ARTICLE OR SERVICE	UNIT PRICE	TOTAL PRICE
(Bidder: To Clarify Your Bid on Each Article, Please Record Mfgr's Name, Brand, and Model or Cat. No.)		
PRICES MUST NOT INCLUOE ILLINOIS RETAILERS OCCUPATION TAXES OR USE TAXES	GRAND TOTAL	

Prices must be recorded in ink or with typewriter.

PROPOSAL: If this bid is accepted within 45 days from the date of opening, the undersigned offers and agrees to furnish any or all of the articles or services upon which prices are quoted, at the price and the delivery time stated, and subject to all the conditions recorded on the reverse side of this sheet.

CASH DISCOUNT TERMS________ APPROXIMATE DELIVERY TIME______DAYS

FIRM SIGNATURE________________

BY____________ TITLE____________

ADDRESS________ CITY________ ZONE___ STATE______

TELEPHONE NUMBER____________ DATE________

(UNSIGNED BIDS WILL NOT BE ACCEPTED)

BID DEPOSIT: AMOUNT $_____; BID BOND_____; ANNUAL BID BOND ON FILE_______

may be an unwise burden on the operating budget; although usually it is more economical to correct faulty operational conditions than to replace a building. A strong case for abandonment arises where such a strain is imposed on administration and supervision by an obsolescent building that it becomes virtually impossible to provide equal educational opportunity for the children.

Relative costs will also affect decisions. The usual procedure is to start with educational objectives and schedules of space need and prepare educational specifications for treatment of existing school plant. These must be appraised as cost estimates. The cost estimates can be prepared by the school architect or informally by a contractor. Of course, alternative solutions should be listed for cost comparison. Economic conditions often dictate the relative cost of proposed renovation from place to place and time to time.

Administration of Modernization Projects. The profile and the inspection record will have served several practical purposes: (1) to screen the school buildings on their order of need for modernization, (2) to estimate the useful life of the buildings, (3) to furnish a statement of defects and deficiencies that can be abstracted when formulating general requirements for rehabilitation or modernization, and (4) to show what facilities are available and their condition.

After broad decisions have been reached on the master plan, features of particular building units singled out for treatment will, of course, need to be reinspected, architecturally planned, and estimated. The amount of technical assistance that the school administrator needs to recruit depends on the scope and nature of the proposed projects.

Statement of requirements. Before the board of education authorizes action to improve an existing plant, a *program of requirements* should be prepared and recommended by the school administration. The degree of detail in which the program of requirements for Public School 32 in Bronx, New York, was drawn up is evident in the report on pages 218–220. Note that an estimate of the total cost is included.

Specifications and drawings. Where an architect is employed (as, for example, in making an addition to a building or in a larger city which retains a coordinating architect) the responsibility of preparing drawings and specifications for modernization of the existing plant can be his. In most instances the school administrator must resort to other means. Starting from the general requirements formulated by the school administrator, he may have a contractor study the problem and propose a specific plan. The contractor's proposal should be stated in writing and in sufficient detail as to quantity, quality, manufacturer's specifications, and general conditions of the work (refer to Chapter 19).

Securing estimates and bids (Figure 7-3). The usual procedure is to

DISCUSSION PROBLEMS

1. Illustrate statements of educational requirements or scope prepared preliminary to the rehabilitation and renovation of an existing school plant.

2. Where implementation of a master plan for improving and expanding the public school plant is to be achieved over a period of years, by what criteria may the priority of projects be determined?

3. Show how school-plant standards have evolved with an emerging educational program: for example, enriched learning opportunities, findings of educational research, flexibility for variety of methods and activities.

4. Describe a plan for acquainting those who participate in the school-plant planning with the characteristics of modern school buildings (as contrasted with ordinary home and small business structures). How much emphasis should be placed upon "trends" in school design?

5. A rural consolidated school recently added to its staff a technician to look after and repair its mechanical equipment. What classifications of equipment could this man service?

6. What limits should be placed on the durability and long-term soundness of school building in planning new construction?

7. State the arguments for and against adoption of some uniform design or common plan for all the unit buildings of a school district.

8. Illustrate the combined planning of architects, illuminating engineers, and color decorators in achieving proper illumination arrangements.

9. Demonstrate that some degree of the functionalism of modern schools is related to the changing customs of land usage in the rural and metropolitan areas.

10. What adaptations would you probably have to make in applying the *School Plant Survey Record* proposed in this chapter to (*a*) small elementary schools which do not have all the special areas listed, (*b*) very large secondary schools with many laboratory and special rooms, (*c*) campus-type rural schools with numerous building units on the site?

11. Apply the supplemental check list of substandard characteristics given in Chapter 7 to a school building. How does the information thus obtained compare in usefulness with the evaluative form of the *School Plant Survey Record*?

12. What information concerning the functionality of spaces might you obtain from inspection that would not be evident from floor-plan sketches?

RELATED READINGS

Adams, B.: "Architects Fit Modern Ideas to Old Buildings," *School Executive*, 69:49–50, November, 1949.

Barrow, J. M.: "Add a Building Contractor to the Planning Team," *Nation's Schools*, 60:73–74, September, 1957.

Department of Education: *School Plant Construction and Rehabilitation*, State of Ohio, Columbus, Ohio, 1951.

separate material and labor. The standards for materials can be compared and alternates priced. The estimate should include delivery to the site. The contractor's advice should be sought as to how the type of material will affect labor or installation costs.

Financing modernization projects. Generally across-the-board modernization and small enterprises, such as new furniture, rewiring, or building renovation, are financed from current revenue on a pay-as-you-go basis. This often necessitates spreading the program of modernization over a period of years. When additions to an existing school plant are undertaken, it is customary to include modernization of the existing plant in the capital-improvement budget (refer to Chapter 14).

The virtual certainty of modernization being a continual cost burden over the years is a reasonable argument for either state grants for this purpose or for including capital outlay in the minimum foundation program supported by the state.

SUMMARY

The existing school plant is a logical starting place for a technical evaluation of plant requirements. A school-plant survey must be made in order to know the available spaces, to plan the utilization, to determine substandardness, to estimate costs, and to plan an orderly adjustment within the master plan.

The survey should be conducted with the competencies of an educator, an engineer, and an architect. An inspection record is desirable so that the adequacies and inadequacies of the existing plant may be readily evaluated by others. The instruments consist of simplified plan sketches, a school-plant-survey score form, and check lists. The school site is usually evaluated separately from the improvements.

Nationally accepted standards are the basis for evaluation. However, these should be modified to fit local conditions, and the creative ability of the school architect and planners should not be unduly restricted by the application of such standards.

The survey data are used to reach decisions concerning the existing plant, its long-range need and usefulness, its contribution to the educational program, its capacity and convertibility, and any proposals for additions, alterations, or modernization.

Modernization ought to be administered in an orderly manner. Priorities must be established among the modernization needs. The administrator must recommend a program of requirements, and usually he is the person responsible for the business arrangements to get the work completed. The variety of circumstances under which modernization is conducted depends upon the part that such projects have in the long-range master plan.

CHAPTER 8

Utilization of Available Facilities

Efficient utilization of the entire school plant is a primary means of economy. When necessity arises for new bond issues and taxes to build new schools, one looks to see if the present plant is fully occupied and if the proposed school plant will be profitably utilized. At least three steps need to be taken: (1) an inventory of existing plant facilities and their capacity, (2) a study of alternative ways of increasing the immediate school-plant utilization, and (3) advance planning for long-term utilization.

PROBLEMS OF MEASURING CAPACITY

New school buildings are designed for a total rated capacity under specific kinds of utilization. Considerable leeway allowing for normal enrollment fluctuations, perhaps as much as one-fifth the total rated capacity, is implied in the normal capacity. Capacity rating of any school building is not only a summation of planned pupil stations having standard square footage but also a function of the utilization schedule as expressed in a certain efficiency formula. Computing the capacity of an existing school plant, other than buildings recently erected, requires special techniques. There is apt to be confusion and conflict among the various conclusions reached, and the lack of agreement could result in divided opinion within the school board or on a school-bond referendum. The solution depends upon an exact inventory of available spaces.

Basic Use of Floor Plans. Inventory of existing usable space should begin with preparation of floor-plan sketches. The detailed kind of

Engelhardt, N. L.: *Elementary School Building Score Card and Survey Manual*, Bureau of Publications, Teachers College, Columbia University, New York, 1936.

——— and Fred Engelhardt: *Planning School Building Programs*, Bureau of Publications, Teachers College, Columbia University, New York, 1930.

Engelhardt, N. L., N. L. Engelhardt, Jr., and Stanton Leggett: *Torrington, Connecticut, Long-range School Building Program*, report of a survey, New York, 1954.

Floor Maintenance Manual: Trade Press Publishing Company, Milwaukee, 1956.

Hynds, Harold D.: "Modernization Pays Well If the Job Is Comprehensive," *Nation's Schools*, 46:74–76, November, 1950.

Landes, Jack L., and Merle R. Sumption: *Citizens' Workbook for Evaluating School Buildings*, Wm. C. Brown Company, Dubuque, Iowa, 1951.

Landrum, H. M.: "A Superintendent's Handbook for School Building Planning and Construction," unpublished dissertation, University of Houston, Houston, Tex., 1949.

Linn, Henry H. (ed.): *School Business Administration*, The Ronald Press Company, New York, 1956, chap. 14.

———: "Modernizing School Buildings," *The American School and University*, 24:401–405, 1952.

———: *The Report of the Survey of the Plant Facilities of the Public Schools of Worcester, Massachusetts*, Institute of Field Studies, Teachers College, Columbia University, New York, 1949.

New York State Commission on School Buildings: *What to Do about Old School Buildings: Modernization Versus Replacement Handbook*, Albany, N.Y., 1954.

Starin, A. N.: "Do's and Dont's for Remodeling," *Nation's Schools*, 40:34–37, November, 1947.

Stoneman, Merle A., Knute O. Broady, and Alanson D. Brainard: *Planning and Modernizing the School Plant*, University of Nebraska Press, Lincoln, Neb., 1949.

Sumption, Merle R.: *How to Conduct a Citizens School Survey*, Prentice-Hall, Inc., Englewood Cliffs, N.J., 1952.

U.S. Office of Education: *School Facilities Survey; First Progress Report*, Washington, 1952.

Viles, N. E.: *School Buildings: Remodeling, Rehabilitation, Modernization, Repair*, U.S. Office of Education, Washington, 1950.

Whitehead, Willis A., and Richard L. Featherstone: "School Building Survey Technique," *The American School and University*, 20:102–108, 1948.

Wilson, W. K.: "School Plant Survey Techniques," *Review of Educational Research*, National Education Association, 18:13–16, February, 1948.

CHAPTER 8

Utilization of Available Facilities

Efficient utilization of the entire school plant is a primary means of economy. When necessity arises for new bond issues and taxes to build new schools, one looks to see if the present plant is fully occupied and if the proposed school plant will be profitably utilized. At least three steps need to be taken: (1) an inventory of existing plant facilities and their capacity, (2) a study of alternative ways of increasing the immediate school-plant utilization, and (3) advance planning for long-term utilization.

PROBLEMS OF MEASURING CAPACITY

New school buildings are designed for a total rated capacity under specific kinds of utilization. Considerable leeway allowing for normal enrollment fluctuations, perhaps as much as one-fifth the total rated capacity, is implied in the normal capacity. Capacity rating of any school building is not only a summation of planned pupil stations having standard square footage but also a function of the utilization schedule as expressed in a certain efficiency formula. Computing the capacity of an existing school plant, other than buildings recently erected, requires special techniques. There is apt to be confusion and conflict among the various conclusions reached, and the lack of agreement could result in divided opinion within the school board or on a school-bond referendum. The solution depends upon an exact inventory of available spaces.

Basic Use of Floor Plans. Inventory of existing usable space should begin with preparation of floor-plan sketches. The detailed kind of

Engelhardt, N. L.: *Elementary School Building Score Card and Survey Manual,* Bureau of Publications, Teachers College, Columbia University, New York, 1936.

——— and Fred Engelhardt: *Planning School Building Programs,* Bureau of Publications, Teachers College, Columbia University, New York, 1930.

Engelhardt, N. L., N. L. Engelhardt, Jr., and Stanton Leggett: *Torrington, Connecticut, Long-range School Building Program,* report of a survey, New York, 1954.

Floor Maintenance Manual: Trade Press Publishing Company, Milwaukee, 1956.

Hynds, Harold D.: "Modernization Pays Well If the Job Is Comprehensive," *Nation's Schools,* 46:74–76, November, 1950.

Landes, Jack L., and Merle R. Sumption: *Citizens' Workbook for Evaluating School Buildings,* Wm. C. Brown Company, Dubuque, Iowa, 1951.

Landrum, H. M.: "A Superintendent's Handbook for School Building Planning and Construction," unpublished dissertation, University of Houston, Houston, Tex., 1949.

Linn, Henry H. (ed.): *School Business Administration,* The Ronald Press Company, New York, 1956, chap. 14.

———: "Modernizing School Buildings," *The American School and University,* 24:401–405, 1952.

———: *The Report of the Survey of the Plant Facilities of the Public Schools of Worcester, Massachusetts,* Institute of Field Studies, Teachers College, Columbia University, New York, 1949.

New York State Commission on School Buildings: *What to Do about Old School Buildings: Modernization Versus Replacement Handbook,* Albany, N.Y., 1954.

Starin, A. N.: "Do's and Dont's for Remodeling," *Nation's Schools,* 40:34–37, November, 1947.

Stoneman, Merle A., Knute O. Broady, and Alanson D. Brainard: *Planning and Modernizing the School Plant,* University of Nebraska Press, Lincoln, Neb., 1949.

Sumption, Merle R.: *How to Conduct a Citizens School Survey,* Prentice-Hall, Inc., Englewood Cliffs, N.J., 1952.

U.S. Office of Education: *School Facilities Survey; First Progress Report,* Washington, 1952.

Viles, N. E.: *School Buildings: Remodeling, Rehabilitation, Modernization, Repair,* U.S. Office of Education, Washington, 1950.

Whitehead, Willis A., and Richard L. Featherstone: "School Building Survey Technique," *The American School and University,* 20:102–108, 1948.

Wilson, W. K.: "School Plant Survey Techniques," *Review of Educational Research,* National Education Association, 18:13–16, February, 1948.

health clinics, conference rooms, men's and women's faculty rooms, cafeteria manager's office, attendance office, and all related storage, lavatories, reception rooms, and cloakrooms. Other areas of a general-service character are cafeteria kitchen and storage, coat-checking rooms, and auxiliary facilities such as public libraries or bus garages, loading areas, and school-bus maintenance shops.

The general service spaces have some relationship to enrollment, but they are so variable that it would be impractical to state any formula based on average practice. These spaces do not add anything to the rated capacity of a building. They may be blocked out on the floor plans as far as capacity is concerned unless they should be converted to instructional use.

Assemblage spaces. Assemblage spaces are recognized as educationally purposeful and intrinsic to the modern school program within limits. The number and size of these spaces is proportionate to the enrollment and the usage demanded in the community. They include (1) auditorium and its accessory stage, dressing rooms, scenery storage, furniture storage, passageways, exits, offices, and control rooms; (2) gymnasium and its accessory dressing rooms, shower rooms, team rooms, corrective-exercise rooms, apparatus storage, passageways, and offices; (3) cafeteria or lunchroom with its accessories for multiuse; (4) enclosed play spaces, field houses, stadiums, and bath houses; (5) library and its suite of storage rooms, conference rooms, or offices; and (6) such facilities as are found in many modern school plants for promotion of student life, including student-activity offices for finance, student council, dramatics, athletics, journalism, and student lounges.

The complexity of scheduling these spaces makes it difficult to determine how much, if anything, they contribute to the net capacity of the building. During the normal operational schedule of a secondary school they do engage a certain percentage of the net enrollment at any given time. But during a homeroom period the pupils are usually shifted to regular classrooms. Special teachers, including physical education, remedial instructors, oral English, supervisors, music instructors, and librarians, often escape homeroom duty. It may well be maintained that these staff members can use this time to better advantage for necessary conferences with small groups of pupils on an informal basis; in fact, it may be their only good opportunity to have such informal conferences. Furthermore they may need the opportunity to prepare special apparatus, and assemblage spaces have to be cleared for this purpose. To this extent the assemblage spaces supply a number of the needed *teacher stations*, even though they normally duplicate or afford only *stand-by pupil stations.*

Yet in a period of peak enrollment if assemblage areas are ruled out of capacity estimation entirely, there is a risk of overbuilding for normal

sketches used for evaluating the building as explained in the preceding chapter will serve also in computing capacity. The original blueprints of the building by the school architect are not easy to use for space inventory because they may not show changes during construction or alterations in subsequent years, and they are too cumbersome and detailed for the purpose. Even small school systems can find a person, perhaps the mechanical drawing teacher, who will produce the simplified floor-plan sketches required.

Floor-plan sketches are the proper approach to an exact inventory of capacity, but they cannot be administered from a central office unless supplemented by field inspection. Any of the following factors, discovered upon inspection of the premises, may cause a correction in capacity estimation based upon floor plans: unusual ceiling heights or slopes, existence of some environmental nuisance, obstructed fenestration, fire hazards, unsafe egress, impractical relationship to other rooms, some special or traditional utilization that overweighs other considerations, lack of sanitary or other facilities, lack of proper accessibility, as auditoriums on upper floors, special difficulty of supervision, probable conversion of the space to other purposes.

Of course, it must first be determined in general that the old plant under survey is acceptable for the intended use or can economically be made so. It is necessary to ascertain that the location of the building is acceptable, that the educational purpose of its use is known, and that it is structurally and otherwise up to standard. The floor plans must be examined for needed auxiliary spaces, and all desired modernization plotted in. With the dimensioned floor plans laid out, the spaces may be classified as classrooms, laboratories, library, offices, special rooms, foyers, etc. Some rooms may be oversized, but even so, no more than the normal class would be allocated. Some rooms may be slightly under standard size, but if they are going to be used under school-board policy as normal classrooms, they are so allocated.

Categories of School-plant Space. The available space as shown on the floor plans of existing buildings may be roughly designated in three categories:

General service spaces. A part of the space in every building is mainly noninstructional but essential to the general operation: corridors, stairways, foyers, general storage rooms, basements, boys' and girls' lavatories, custodian's utility closets, textbook-storage rooms, furnace rooms, fuel storage, custodian's office, electrical control room, fan rooms, loading platforms, and the like. Also included in this category are the general administrative spaces such as superintendent's office, public office, principal's office, board room, vault, business office, mimeograph room, public-address-system control room, guidance counselor's office, nurse's office,

assigned the available room areas will vary as discussed in the following section.

Pupil-station Square-footage Standards. Attempts have been made to establish a minimum amount of square footage per pupil capacity for purposes of state aid in school building, as illustrated in the California plan of supporting minimum building needs.[1] The worthy objective of these normative standards is to encourage local school authorities and school architects to experiment and adapt spaces functionally to the locally determined program of activities. Minimum total building areas per pupil are specified in the California building-aid law as shown in Table 8-1.

Table 8-1. California Building-aid Law

School	*Enrollment*	*Square feet per pupil*
Elementary school comprising kindergarten and grades 1 to 6, inclusive	300 or more	55
Elementary school comprising grades 7 and 8	750 or more	75
Junior high school comprising grades 7 to 9, inclusive	750 or more	75
Junior high school comprising grades 7 to 10, inclusive	750 or more	75
High school comprising grades 7 to 12, inclusive	750 or more	80
Junior college comprising grades 11 to 14, inclusive	750 or more	80

Specific guidance is required for projecting the educational program of a departmentalized system. The probable utilization must be established for various sizes of recitation rooms, for number and size of science laboratories and libraries, and for departmental spaces in teaching homemaking, industrial arts, agriculture, music, art, physical education, dramatics, and business education. Different sizes and classifications of departmentalized schools have characteristic ratios of class size within their normal schedules. There are average accepted practices as to demand for special rooms. Where normative practices have been established on the basis of experience, the observed ratios give at least a point of departure. The formulas need be adjusted only for marked local deviations in order to arrive at a probable operation and utilization schedule. A formula

$$\text{Interchangeable teacher stations} = \frac{(\text{Enrollment} \div 8) + 12}{\text{Daily periods}}$$

[1] *State Provisions for Financing Public-school Capital Outlay Programs*, U.S. Office of Education, Bulletin no. 6, Washington, 1951.

times. The preferred method of estimating capacity would be to assign many assemblage spaces of the secondary school at least a homeroom capacity of twenty to fifty pupils during peak periods. The alleviation of conflicting duties could rest in multischeduling, whereby all pupils need not be scheduled to homeroom periods at the same hour.

Classrooms (both multipurpose and special). After the general service and assemblage spaces are blocked out on the floor-plan sketches, there remain various kinds of instructional rooms, classrooms, laboratories, vocational rooms, and the like, with their necessary cloak storage, work area, and teacher-station spaces. The conclusion seems to be inescapable that the utdization of classrooms determines in the final analysis the net capacity of the building.

It is true some communities hold that to "house" the enrollment they need build only classrooms. But modern education is found to function throughout the whole plant as a unit. Many efforts have been made to parcel out the auxiliary spaces as somehow classroom-related; for example, in a small neighborhood elementary school the general-purpose spaces are included in the specified total square footage per pupil station. But in larger schools such spaces are functionally determined, and attempts to establish ratios to the number of classrooms are overweighed by the effect of decisions on educational policy and method. From the standpoint of a discrect measure of operational building capacity, the most direct procedure is to assign an operational building capacity only to classrooms of various kinds.

When renovating or modernizing an existing building, it takes considerable fortitude and strength of policy either to reduce the plant capacity by converting classrooms into service and assemblage areas or to build such areas as additions to the old building with the knowledge that the addition will not increase plant capacity. Often the probable future life and usefulness of the building is a major factor and reasonable compromises are the logical outcome. On the other hand, a new school plant can be designed and erected to accommodate a stated capacity with due thought to efficient utilization of the whole and with functional areas for desired activities.

STANDARDS FOR DETERMINING CAPACITY

The standards for assigning capacity to various classrooms shown on the floor plans of existing buildings will depend upon the grade levels and organization of the school program. With the self-contained elementary program, the operational class size may be assigned each available classroom, allowing exceptions for kindergartens, special educational classes, etc. With departmentalized programs the pupil-station capacity

assigned the available room areas will vary as discussed in the following section.

Pupil-station Square-footage Standards. Attempts have been made to establish a minimum amount of square footage per pupil capacity for purposes of state aid in school building, as illustrated in the California plan of supporting minimum building needs.[1] The worthy objective of these normative standards is to encourage local school authorities and school architects to experiment and adapt spaces functionally to the locally determined program of activities. Minimum total building areas per pupil are specified in the California building-aid law as shown in Table 8-1.

Table 8-1. California Building-aid Law

School	*Enrollment*	*Square feet per pupil*
Elementary school comprising kindergarten and grades 1 to 6, inclusive	300 or more	55
Elementary school comprising grades 7 and 8	750 or more	75
Junior high school comprising grades 7 to 9, inclusive	750 or more	75
Junior high school comprising grades 7 to 10, inclusive	750 or more	75
High school comprising grades 7 to 12, inclusive	750 or more	80
Junior college comprising grades 11 to 14, inclusive	750 or more	80

Specific guidance is required for projecting the educational program of a departmentalized system. The probable utilization must be established for various sizes of recitation rooms, for number and size of science laboratories and libraries, and for departmental spaces in teaching homemaking, industrial arts, agriculture, music, art, physical education, dramatics, and business education. Different sizes and classifications of departmentalized schools have characteristic ratios of class size within their normal schedules. There are average accepted practices as to demand for special rooms. Where normative practices have been established on the basis of experience, the observed ratios give at least a point of departure. The formulas need be adjusted only for marked local deviations in order to arrive at a probable operation and utilization schedule. A formula

$$\text{Interchangeable teacher stations} = \frac{(\text{Enrollment} \div 8) + 12}{\text{Daily periods}}$$

[1] *State Provisions for Financing Public-school Capital Outlay Programs*, U.S. Office of Education, Bulletin no. 6, Washington, 1951.

based on studies by Dr. W. H. Wilson has been used by the New York State Education Department as a guide for projecting educational-space needs for secondary school classrooms exclusive of laboratories in relation to given enrollment capacities, reflecting average practice in well-organized rural school consolidations and in small city comprehensive secondary schools.

Consensus as to square footage per pupil station for a particular type of room or activity may be gained from authoritative publications (several state departments of education publish such standards) and there is a

Table 8-2. Typical Square-footage Standards for Instructional Rooms

Type of room	*Square feet per pupil station*	*Minimum area in square feet*
Elementary classroom	30–35	950
Kindergarten	40	1200
High school recitation rooms	18–25	—
Science laboratories	30–40	—
Homemaking	40	1200
Business education	35	—
Art	30–35	—
Music	25	—
Industrial arts	50–75	1500
Agriculture	75–100	1500
Reading rooms	25	—
Dining area	15	—

surprising amount of agreement. Much depends on exactly what sort of program of educational activity one has in mind, just as there is a divergence in practice as to class size or as to pupil-teacher ratio supported in state-aid programs. Pupil-teacher ratio supported in the Texas Foundation Program Act, for example, is approximately 26 to 1.

The norms stated in Table 8-2 are a very rough guide for determination of the standard capacity of a particular room. Usually a given standard is developed from a number of studies of classroom operation and from the experience of professional people engaged in the field. Publications also are available demonstrating typical layouts. Many square-footage guides are based upon manufacturer's specifications, auditorium seating, machine-shop stations, lavatory fixtures, science-room layouts, library-furniture specifications, physical education courts and apparatus, and the like.

A promising line of investigation would be to test the various combina-

tions of pupil activity and furnishings in model layouts to see what space is utilized and where space can be saved. This question is of such grave importance that it is well to consult authoritative standards and qualified research agencies before giving final approval to the preliminary floor-plan sketches proposed by the school architect on the basis of educational specifications given him.

Definition of Capacity. The existing plant capacity may be construed in terms of (1) standard capacity, (2) operational capacity, (3) emergency capacity, and (4) functional capacity.

Standard capacity. Standard capacity would be computed by the same scale of values for older existing buildings as for a new building. Square-footage area will determine the number of pupil stations in both instances. The basic theory of standard capacity is to rate all buildings by the same pupil-station standards as commonly accepted in new building design.

The total rated capacity of school buildings that have been recently completed or that are now in the construction stages may ordinarily be used for school-survey purposes, provided investigation has shown that modern standards were applied and that the fullest possible economy of scheduling was intended. Doubtless more research is needed on the subject of square-footage standards for new buildings, and very likely more imaginative experimentation with scheduling and functionality will occur in the future. For immediate practical purposes, the general concept of total building capacity standards for new buildings must be accepted in terms of known educational factors and the balanced judgment of experienced authorities, as illustrated in the above square-footage guides.

Operational capacity. Operational capacity, or normal capacity, is a more realistic measurement for an older existing plant. Most cities have a wide variety of school plants accumulated over a period of years. Each quarter century has brought new concepts of grouping children for instructional purposes and new goals in shape, area, and relationship of rooms, not to mention new functional uses for rooms. Thus classrooms built in the latter part of the last century may be found more spacious than those conforming to prevalent practice in the first decades of this present century. The classrooms available in many cities for elementary school use will therefore be of variously assorted sizes. The rooms available for secondary school purposes will simply have become outmoded because of the city's enrollment growth and curriculum change. It would be arbitrary and wasteful to discard much of the existing plant that is structurally sound merely because of idealistic square-footage standards developed as a guide for designing new construction.

The operational approach to determining room capacity recognizes

based on studies by Dr. W. H. Wilson has been used by the New York State Education Department as a guide for projecting educational-space needs for secondary school classrooms exclusive of laboratories in relation to given enrollment capacities, reflecting average practice in well-organized rural school consolidations and in small city comprehensive secondary schools.

Consensus as to square footage per pupil station for a particular type of room or activity may be gained from authoritative publications (several state departments of education publish such standards) and there is a surprising amount of agreement. Much depends on exactly what sort of program of educational activity one has in mind, just as there is a divergence in practice as to class size or as to pupil-teacher ratio supported in state-aid programs. Pupil-teacher ratio supported in the Texas Foundation Program Act, for example, is approximately 26 to 1.

Table 8-2. Typical Square-footage Standards for Instructional Rooms

Type of room	*Square feet per pupil station*	*Minimum area in square feet*
Elementary classroom	30–35	950
Kindergarten	40	1200
High school recitation rooms	18–25	—
Science laboratories	30–40	—
Homemaking	40	1200
Business education	35	—
Art	30–35	—
Music	25	—
Industrial arts	50–75	1500
Agriculture	75–100	1500
Reading rooms	25	—
Dining area	15	—

The norms stated in Table 8-2 are a very rough guide for determination of the standard capacity of a particular room. Usually a given standard is developed from a number of studies of classroom operation and from the experience of professional people engaged in the field. Publications also are available demonstrating typical layouts. Many square-footage guides are based upon manufacturer's specifications, auditorium seating, machine-shop stations, lavatory fixtures, science-room layouts, library-furniture specifications, physical education courts and apparatus, and the like.

A promising line of investigation would be to test the various combina-

tions of pupil activity and furnishings in model layouts to see what space is utilized and where space can be saved. This question is of such grave importance that it is well to consult authoritative standards and qualified research agencies before giving final approval to the preliminary floor-plan sketches proposed by the school architect on the basis of educational specifications given him.

Definition of Capacity. The existing plant capacity may be construed in terms of (1) standard capacity, (2) operational capacity, (3) emergency capacity, and (4) functional capacity.

Standard capacity. Standard capacity would be computed by the same scale of values for older existing buildings as for a new building. Square-footage area will determine the number of pupil stations in both instances. The basic theory of standard capacity is to rate all buildings by the same pupil-station standards as commonly accepted in new building design.

The total rated capacity of school buildings that have been recently completed or that are now in the construction stages may ordinarily be used for school-survey purposes, provided investigation has shown that modern standards were applied and that the fullest possible economy of scheduling was intended. Doubtless more research is needed on the subject of square-footage standards for new buildings, and very likely more imaginative experimentation with scheduling and functionality will occur in the future. For immediate practical purposes, the general concept of total building capacity standards for new buildings must be accepted in terms of known educational factors and the balanced judgment of experienced authorities, as illustrated in the above square-footage guides.

Operational capacity. Operational capacity, or normal capacity, is a more realistic measurement for an older existing plant. Most cities have a wide variety of school plants accumulated over a period of years. Each quarter century has brought new concepts of grouping children for instructional purposes and new goals in shape, area, and relationship of rooms, not to mention new functional uses for rooms. Thus classrooms built in the latter part of the last century may be found more spacious than those conforming to prevalent practice in the first decades of this present century. The classrooms available in many cities for elementary school use will therefore be of variously assorted sizes. The rooms available for secondary school purposes will simply have become outmoded because of the city's enrollment growth and curriculum change. It would be arbitrary and wasteful to discard much of the existing plant that is structurally sound merely because of idealistic square-footage standards developed as a guide for designing new construction.

The operational approach to determining room capacity recognizes

in the first place that it would be quite impractical to adjust teaching load precisely to existing room size. Inasmuch as instructional salary is the major portion, perhaps three-fourths of the annual budget, the teacher-pupil assignments have to be equalized. In reality each elementary teacher will be assigned a normal class load without regard to space standards. Since this is so, any capacity figure would be worthless unless some reasonable compromise with the currently accepted ideal of space standards per pupil station was reached. Most cities have had to make such compromises in their policy for the relief of overcrowded conditions. Assuming, for example, that the normal teaching load is twenty-eight to thirty pupils per elementary teacher in a given city, the standard for new classroom construction may be 35 square feet per child or about 950 gross square feet per room. But in dealing with existing buildings the school board may tolerate as low as 18 square feet per child or 540 square feet per room. The question is no longer one of number of pupil stations as judged by optimum square-footage standards. The practical issue is whether a given room can be used at all for regular classes or not.

The maximum load that can be accommodated at any one time in a normal working day or session is the operational capacity. Thus the operational capacity of an elementary school building is a multiple of the number of normal classes that can be accommodated in the building layout. The operational capacity of a secondary school building is similarly arrived at, except that the distribution of regular and special classes for an average period must be adjusted by an efficiency ratio of 60 per cent to 90 per cent, as explained below, to make allowance for variations that occur from hour to hour during the school day in the load to be accommodated.

Besides the areas of the building used to accommodate regular teacher stations there will be other areas for auxiliary purposes, including offices, clinics, library, auditorium, gymnasium, cafeteria, and possibly vocational, science, music, or other limited-purpose rooms. The older expression of auxiliary spaces is more often thought of today as essential spaces. Many areas of the existing school plant must be reserved for essential services and operational capacity measures are applied on only the remaining portion. There is suggested the interesting possibility that by more ingenious scheduling the operational capacity of a building might be made to exceed the regular classroom teacher-assignment space. In a campus-type development one set of auxiliary spaces could partly relieve the load of several buildings arranged in a cluster. Or by multischeduling the auxiliary spaces could handle excess pupils from overlapping school sessions.

In one sense basing capacity on normal teaching load appears to negate all standards and indeed make meaningless the term capacity because

the capacity of a building can be manipulated to suit the number of children one chooses to put there. In other words, if the number of existing rooms limits the number of teacher stations, would increasing the number of pupils per teacher increase the capacity? One is forced to accept that size of class and teacher load are based on very strong policy factors which have little to do with room size.

The goal of achieving ideal-sized rooms for all classes by renovation and moving partitions can be carried only so far because of structural factors of a given building. Some compromises with optimum square-footage standards are inevitable. It is interesting that programs of modernization are usually found to decrease the capacity of existing school buildings where improvement of educational services is the objective. Yet seldom do modernization plans salvage the surplus area of oversized classrooms; instead in the zeal to overcome obsolescence some degree of wasted space is often incurred.

The operational capacity must be set on a standard that will not prevent good educational results from the money spent on teacher salaries, and on a level below the emergency capacity to allow for normal fluctuations of class enrollment, inasmuch as emergency capacity has to be by definition the absolute limit at any time.

Emergency capacity. The third type of capacity measure, emergency capacity, is a useful check on the other kinds. It may be defined as a legal maximum capacity. In many cities the board of health or the fire department, under a city code, enforce standards of health and safety with respect to public assemblies including classrooms. The minimum legal square footage may be 12 square feet per individual. Or possibly corridor width, fire escapes, ceiling height, ventilation, and fenestration are elements in the code. Ultimate emergency capacity by its own definition is inflexible. If an auditorium has a maximum capacity under the fire or health code, that maximum may not with impunity be exceeded. Moreover, only under emergency conditions would the maximum be reached.

Functional capacity. An inventory of space is meaningless except in relation to function. Since our understanding of teaching activity or learning activity and its objective facilities and environment is undergoing continuous change, the true value of existing spaces depends on the educational philosophy of a school system at the time an inventory is taken. It is generally understood that the pupil activity will be under the supervision and control of the staff. Thus the space inventory may be expressed in terms of teacher stations to which is related a group of pupil stations under the teacher's oversight.

A fairly simple scheme of space inventory is illustrated in the self-contained elementary classroom program where pupil capacity is a

in the first place that it would be quite impractical to adjust teaching load precisely to existing room size. Inasmuch as instructional salary is the major portion, perhaps three-fourths of the annual budget, the teacher-pupil assignments have to be equalized. In reality each elementary teacher will be assigned a normal class load without regard to space standards. Since this is so, any capacity figure would be worthless unless some reasonable compromise with the currently accepted ideal of space standards per pupil station was reached. Most cities have had to make such compromises in their policy for the relief of overcrowded conditions. Assuming, for example, that the normal teaching load is twenty-eight to thirty pupils per elementary teacher in a given city, the standard for new classroom construction may be 35 square feet per child or about 950 gross square feet per room. But in dealing with existing buildings the school board may tolerate as low as 18 square feet per child or 540 square feet per room. The question is no longer one of number of pupil stations as judged by optimum square-footage standards. The practical issue is whether a given room can be used at all for regular classes or not.

The maximum load that can be accommodated at any one time in a normal working day or session is the operational capacity. Thus the operational capacity of an elementary school building is a multiple of the number of normal classes that can be accommodated in the building layout. The operational capacity of a secondary school building is similarly arrived at, except that the distribution of regular and special classes for an average period must be adjusted by an efficiency ratio of 60 per cent to 90 per cent, as explained below, to make allowance for variations that occur from hour to hour during the school day in the load to be accommodated.

Besides the areas of the building used to accommodate regular teacher stations there will be other areas for auxiliary purposes, including offices, clinics, library, auditorium, gymnasium, cafeteria, and possibly vocational, science, music, or other limited-purpose rooms. The older expression of auxiliary spaces is more often thought of today as essential spaces. Many areas of the existing school plant must be reserved for essential services and operational capacity measures are applied on only the remaining portion. There is suggested the interesting possibility that by more ingenious scheduling the operational capacity of a building might be made to exceed the regular classroom teacher-assignment space. In a campus-type development one set of auxiliary spaces could partly relieve the load of several buildings arranged in a cluster. Or by multischeduling the auxiliary spaces could handle excess pupils from overlapping school sessions.

In one sense basing capacity on normal teaching load appears to negate all standards and indeed make meaningless the term capacity because

are so designed that a play or assembly area may be partitioned for classroom space when necessary, a plan that is especially promising where there is a seasonal problem of migrant or temporary populations.

The estimation of capacity is complicated where the function and use of the plant is not assigned purely to a given division of the school system. This is illustrated in campus-type plans where assembly, library, shop, cafeteria, play spaces, science rooms, etc., are used alternately by primary, intermediate, junior high, senior high, and adult sections of the school. Utilized under one schedule, these rooms contribute a certain amount to the total building capacity and under another schedule, a different amount. The operational capacity varies with the changing programs. Sometimes schools are built with a view to later conversion to other usage, and they will have a present capacity and a probable future capacity. Obviously the capacity of a building is valid only for the intended usage.

Often school buildings have several organizational uses. Parts of buildings may house administrative departments, or public libraries, or public meeting rooms, in addition to regular school facilities. It is not right to ignore such areas in making a capacity inventory. They may be listed as *contingency capacity* to be converted if advisable to regular school use in an emergency.

The present tendency toward developing a workshop approach to the curriculum, with its emphasis on individual and small-group instruction in the intermediate and junior high school grades, may result in a demand for more office space (which formerly was the prerogative of a chosen few, the physical education teacher, the band director, the shop instructor, etc.). Better facilities for group conferences are being designed, frequently as a part of an enlarged library plan. Enough is evident in the way of changing methods to make one cautious about advocating any arbitrary formula for establishing necessary spaces that comprise capacity.

The general education movement, especially in social studies and language arts, may require space for both large-scale lectures and smaller instructional clinics and laboratories. Practices with respect to school-library functions and resource centers are apt to change considerably. Provision for supervised study will depend upon the local school philosophy. Educational television is in its infancy. New concepts as to equipment and scheduling of vocational education are emerging. Long-term policies as to integration and specialization of instruction, the scope of the public school offering, and specific services to be rendered will tend to modify the normative ratios of instructional space units. Obviously wide departures from status formulas may be expected in the years ahead.

multiple of teacher stations. While it is generally true that the classroom teacher has a homeroom base of operation, his range of activities may extend to other parts of the plant. He may accompany groups of pupils to assembly, cafeteria, or play spaces. He may take them to the library, nature-study room, or other laboratories. Obviously his homeroom station has related areas of considerable extent.

If the same method were extended to the departmentalized secondary school, all that would seem to be necessary is to allow for average variation of class size, let us say twenty-pupil and forty-pupil rooms, and assume that teachers interchange rooms for most economical utilization, but several practical considerations interfere with the latter method of inventory. In the case of vocational shops, library, clinics, conference rooms, gymnasium, music practice rooms, and many other specialized facilities, the homeroom-teacher-station concept is unsuited to practical capacity measurement. Moreover, there is a tendency to have on the staff a variety of resource personnel including guidance counselors, remedial teachers, curriculum coordinators, music teachers, oral English instructors, and the like, for whom suitable working space must be provided.

Trends Affecting Capacity Concepts. In recent years the understanding of psychological principles, the methods of group dynamics, and the social mandates of the community have upset traditional measures of school-building capacity. A number of new schools are being designed with spacious lounges, furnished with comfortable informal furniture, where children or adults may informally congregate for social, recreational, and cultural purposes. Separate buildings are being constructed in response to social and cultural demands—field houses, air-conditioned music rehearsal buildings, stadiums, technological plants, such as agriculture buildings, laboratories, and machine shops. Out-of-door activity spaces are being planned in direct relationship to self-contained elementary classrooms. More thought is being given to the exhibition of materials in the classroom. These recent developments are in addition to new uses for the school auditorium, extensive planning of the school library to include conference rooms, storage rooms, and curriculum centers, revamping of the traditional science laboratories and vocational rooms, extensive dressing rooms for the gymnasium, modern layout of the cafeteria, and a variety of administrative units—all of which were well underway two decades ago.

Factors Affecting Efficiency Concepts. Other radical departures from normative practice appear here and there. Some schools use portable serving tables that permit serving lunches in the classroom and save the necessity of a lunchroom area. Large outdoor play sheds, rather than enclosed play spaces, are built in favorable climates. Some schools

practical operating capacity of the building will also include an *efficiency ratio* in utilizing the sum of the operational pupil-station space capacity.

The utilization-efficiency ratio for self-contained classrooms of a primary-level nondepartmentalized elementary school is the easiest to estimate. Where the average class load of regular teachers is taken as normal room capacity, the efficiency ratio can approximate 100 per cent. In practice the ratio may be plus or minus about 20 per cent depending upon local fluctuations of class assignment unless movable partitions are used or room sizes varied. Beyond this type of fluctuation, a school is considered overcrowded or underutilized. The capacity of specialized classrooms for kindergarten or exceptional-children groups must be estimated separately.

On the other hand, the numerous platoon-type elementary departments, junior high schools, senior high schools, vocational schools, and other departmentalized organizations, including very specialized state and regionally established schools, have wide departures in their ratios of utilization efficiency. As a matter of fact, less than half of all the school-plant area in the country is of the primary-level type that can be rated on a 100 per cent capacity basis. Engelhardt and Engelhardt [2] found that in best practice the efficiency range is from 68 per cent to 80 per cent utilization of pupil stations. They consider school buildings with less than 60 per cent utilization to be poorly planned or inefficiently administered. Later studies show that 85 per cent or 90 per cent efficiency may be achieved in larger school buildings. Efficiency of utilization above 85 per cent of the pupil stations in classrooms of a departmentalized building will verge on overcrowding in some parts of the building.

Preliminary to a building program, the small amount of time and expense required to make a utilization-ratio study would be repaid as a means of comparison with experience elsewhere. Such a study is usually made by a composite method for the ordinary school days of an average week. The data consisting of rooms, room capacity, class enrollment, and hour-days may be conveniently posted on cross-section paper (Figure 8-1). The efficiency ratio is the actual weekly enrollment divided by possible weekly capacity. Information obtained from the study would indicate whether or not the efficiency ratio can be improved. The analysis directs attention to idle and underutilized rooms. Revisions of the schedule may put idle rooms to work. If room sizes do not fit class sizes, some building alterations or use of partitions could increase efficiency. If the schedule shows peak loads in some parts of the building for certain periods (e.g., homerooms during roll call) and low utilization of those same rooms the rest of the day, the administration of the schedule could

[2] N. L. Engelhardt and Fred Engelhardt, *Planning School Building Programs*, Bureau of Publications, Teachers College, Columbia University, New York, 1930.

Combined Measures of Capacity. Even if the over-all building space per pupil used for instructional purposes were normative, the internal arrangement as to number and size of rooms would have to be adjusted to local program development. If the number or size of room units were not planned for the possibility of emerging practices but based solely on a normative formula, the building would probably in the long-range view have less efficient utilization of its rated capacity. This was illustrated in a school designed for one homemaking center that soon found it required two or more homemaking centers for the same total enrollment of girls. The saving feature of this dilemma in the past was that as enrollments fluctuated the building capacity was adjusted through structural alterations and additions. Therefore a normative formula provides at any given time only a planning basis from which reasonable adjustment for local factors can be made through flexibility of layout and design. Moreover, the published capacity formulas have contained some degree of allowance for minor variations.

A very practical approach to capacity determination is taken in planning large city junior high schools, senior high schools, and special high schools, based primarily on educational specifications and projected schedules. For this purpose city school administrators usually have the staff and consultant service to make fairly exact determinations of capacity needs. Large cities seem to build rather inflexible vocational and special high school plants, but it must be remembered that flexibility is a system-wide matter and children may be directed to one high school or another according to their individual needs. The contribution of school architects in designing new shapes and relationships of building spaces and adapting new construction methods is discussed in Chapter 12.

In making a survey of the existing school plant an observed difference among the various measures of capacity can be informative. If the operational capacity exceeds standard capacity, it is probable that the old building is educationally substandard—at least it should be investigated for possible modernization. If the operational capacity exceeds 80 per cent of the emergency capacity, it probably would not afford a feasible basis for administration.

Efficiency of Operation. After the available space units shown on the floor plans have been placed in categories according to function, the standard capacity of each classroom or instructional space unit determined by a combination of the measurements already described (namely square footage per pupil station which itself is an elastic figure, although derived from tested practice), and adjustments made for the operational limits imposed by local policy as to class size, teaching assignments, and system of scheduling group activities, a theoretical maximum pupil-station capacity for the available spaces can be established. But the

buildings are a departure from the norm, and their capacities must be determined by local usage.

Adjustment of Capacity Estimates to Special Factors. If the capacity of a school building is taken to be the maximum number of pupils that can be adequately accommodated in the building at one time during *normal* operation (operational capacity), it is apparent that published studies of this question are cast against certain preconceptions as to a normal program. Many schools more or less conform to these preconceptions; others have such unusual factors that much more or much less space is required to achieve the same capacity rating.

The general trend of the past half century with respect to the high school program confirms this impression. A building that has a given rated capacity for a strictly academic curriculum may be found to be inadequate in terms of need for vocational education, physical education, music and dramatics, and many curricular services embraced in student life. Building additions to accommodate an enriched program will not necessarily increase the rated capacity, and it is necessary to recompute capacity with every major change in the functional use of the building.

Some building spaces do not lend themselves conveniently to any conventional method of capacity estimation. A few examples will serve to illustrate this fact. There is considerable experimentation with exterior passageways, both with finger-type plans and back-to-back classrooms. (Architects commonly credit one-half of such square footage in cost analysis.) Separate buildings for special purposes are being built more frequently than in the past: music buildings, athletics field houses, agriculture plants, home economics cottages, nursery schools, biology experiment laboratories, and general artisan shops. Recent low-cost methods of durable construction and new developments in heating, air conditioning, and illumination make it possible to achieve both desired flexibility and less expense with such separate buildings.

The usual steps for estimating capacity of an existing school building which is suitable and structurally sound may be summarized as follows.

CHECK LIST OF PROCEDURES FOR ESTIMATING CAPACITY

1. Decide upon the educational program to be housed in terms of grouping children, conducting activities, and providing services.

2. Adopt standards as to the square-footage space needs per pupil for each of the anticipated types of group activities or special services.

3. Develop a reasonable plan of scheduling the activities in terms of periods of time so as to distribute the pupils evenly throughout the plant.

4. Assign a functional value to all spaces that are available after alterations

be improved. Probably the building principal already has an efficient schedule, but the assumption should be tested periodically. A gain from 65 per cent utilization to 80 per cent utilization in a high school with 700 operational standard pupil stations would increase the operational capacity from 455 to 560. If building capacity can be increased by improving the efficiency ratio, the gain can save the necessity for new facilities. More of the instructional space could perhaps be allocated to needed special rooms.

Fig. 8-1. Method of analysis of instructional space utilization in school buildings.

Room	Operational Capacity		Period Days 1	2	3	4	5	6	7	Weekly Room Capacity	Weekly Room Enrollment	Utilization Efficiency Ratio (Percentage)	Percentage of Periods Idle
		M	32	20	26	30	24	27	12				
#6 General	30	T	32	–	26	18	–	27	35	1050	789	74	11
Science		W	32	20	26	30	24	27	12				
		Th	32	–	26	18	–	27	35				
		F	32	20	26	30	24	27	12				

Thus the highest per cent of classroom utilization that can be worked out is a practical function of rated capacity for a departmentalized building. About the only guide available is normative practice, and this is subject to certain recognized factors:

1. Small secondary schools under 700 enrollment have a lower ratio of classroom utilization because class size is more erratic and specialized rooms cannot be filled every period of the week.

2. Average practice includes a great many irrelevant factors, such as policies concerning homerooms, single-purpose rooms, type of equipment, basement or other substandard rooms, and duplication of special facilities in several building units as against grouping pupils at the place where facilities are available.

3. Norms based on existing practice are not adequately adjusted for attendance since new schools may not have their planned attendance until after they have been occupied a few years, and older schools are often utilized on the basis of their location rather than optimum space efficiency.

4. Indeed the pendulum swings both ways: large city high schools are said to be more efficiently operated where the distance between rooms is reduced by multistory design, and yet many elements of the plant would be more flexible and efficient as separate one-story units. From the standpoint of standard capacity rating, the separate special-function

mate, as illustrated in the quotation which follows, from the NCSC *Guide:* [3]

Example: Assume (1) that a secondary school accommodates a maximum enrollment of 500 day pupils, (2) that facilities required for the day-school program will also be satisfactory for evening programs and community use, and (3) that there will be six scheduled one-hour periods daily exclusive of lunch, assembly, and homeroom and club activities.

Lunchroom: If 80 per cent of the students eat at school in two shifts, the dining room requirement will be 200 seats with a single service line.

Physical Education and Health Instruction Rooms: If every boy and girl is to participate daily in groups of 30 to 35, it will require 15 rooms or space periods per day. It might be assumed that each space can be used five out of the six daily periods, thus establishing a need for three teaching areas. Two of these areas can be provided in a regulation gymnasium convertible into two teaching units, and one teaching area may be provided in a health classroom especially equipped for this purpose.

Library: Assuming no study hall and that each pupil will have an average of three vacant periods per week, or 10 per cent of the total weekly schedule, library reading space will be required for 50 scheduled pupils. Since, however, it is not possible to make a perfectly balanced schedule and there will be extensive unscheduled use of the library by school and community, space should probably be provided for at least 75 pupils.

Music: Assuming an average of two music periods per week per student, or a total of 1,000 student periods weekly, music facilities must be provided to accommodate 200 students daily, or 35 to 40 students per period for five or six periods. The music room should, however, have a capacity of 50 to 75, depending upon size of maximum group.

Instruction Rooms: Two out of the six daily periods have been provided for in the library and the music and physical education facilities. Classrooms, laboratories, and shops must be provided to accommodate 500 students for four periods, or 2,000 student periods daily. To keep the problem simple for illustration, it will be assumed that each student is scheduled for four classes daily, and that each class meets for one period every day. It will also be assumed that each instruction room will accommodate 30 students and that it will be available for six periods daily. Each room could, therefore, accommodate 180 student periods daily if used at capacity every period. As every administrator knows, however, this will not be possible even when the plant is carefully tailored to the program. It is more realistic to assume an average room load of from 125 to 150 student periods in the regular or interchangeable classrooms and from 70 to 100 in the special instruction rooms.

The following table of required teaching rooms is based on a simple and rather conventional program, and is assumed for purposes of illustration only. If classes are not to meet daily, a similar table may be prepared on a weekly basis.

[3] *Guide for Planning School Plants*, National Council on Schoolhouse Construction, Peabody College, Nashville, Tenn., 1949, pp. 55–57.

or modernization as shown on floor-plan sketches—this value to be the maximum operational capacity of the room.

5. Designate areas that contribute only partially or not at all to total pupil capacity—a decision which will depend on the community desires and support of the school. Spectator seating is an obvious illustration of auxiliary space. Many modern school services have been introduced that require spaces in this category.

6. Develop all opportunities for multiple use of special spaces to achieve full-time and full-capacity utilization.

7. Consider where reasonable compromises can be made that would not damage the eductional purposes, such as smaller assembly groups, fewer very small class sections, more use of out-of-door physical activity, portable special equipment, and multiple-platoon scheduling.

8. Determine a utilization-efficiency ratio of operational capacity in terms of pupil stations to assigned class enrollments.

9. Be sure that the spaces evaluated have a reasonable relationship to one another. For example, pupil traffic will determine location of the preprimary rooms; distractions such as shop or music rehearsal must be segregated; agriculture laboratories and the like require suitable ingress. If necessary, space must be sacrificed to gain good relationship. Duplication of special rooms should be avoided where possible.

10. Final evaluation of the building capacity must be a judgment decision based on the probable efficiency in use of the sum-total operational capacity of various types of spaces. This conclusion should be compared with normative practice as shown by published standards. Departures from normal capacity standards ought to be satisfactorily explained. Additional estimates of emergency capacity and contingency capacity should be noted.

There is a difference of opinion about the advisability of constructing several half-size or three-quarter-size interchangeable classrooms to accommodate small-size high school classes. It has been shown that in small rural consolidations the efficiency ratio is improved by having a certain proportion of small recitation rooms for the expected small-size high school classes. It should be noted that these small classes are costly in terms of teacher salary. Smaller secondary schools with under 1,200 enrollment require more staffing to offer an equivalent educational program and therefore have more small departmental classes. Tailoring room size to the expected proportion of small-sized classes would seem to be a reasonable economy. The difficulty is that when enrollments increase and when purpose of use changes the small rooms are found to be inflexible. This can be avoided by planning for this contingency. Larger high schools have less use for small rooms.

Capacity of New Buildings. The present trend is to estimate daily student periods for each activity and tailor the room needs to that esti-

ities may be achieved either by greater diligence in the application of status measurements or by examining rather critically the assumptions underlying status measurements. The following section will analyze some of these assumptions.

The idea of capacity has been seen to give some difficulty. It assumes that children learn by staying relatively fixed in one station for an extended period of time. Actually children leave their stations rather frequently; they go to the library, to the playgrounds, to the office or clinic, to the auditorium, to the cafeteria. This leads to areas called regular pupil stations and to other facilities called related spaces. Any attempt to calculate utilization of related spaces, therefore, ends in frustration or compromise for the surveyor, and especially since these related spaces may easily constitute the greater bulk of space as to both area and cost.

A realistic way to portray utilization of space is to place school-plant area on one axis of a chart and time on the other. Thus for a given area, such as a classroom with its rated capacity, one seeks to observe what fractional part of the given area or capacity is occupied hour by hour during the whole day. Furthermore the idea of time introduces a tremendous range in the concept of percentage of utilization. The utilization rate decreases when the analysis is spread from six to eight hours per day, or to twelve hours per day; and even after allowing necessary time for custodial care of the rooms, the utilization rate drops very low if measured on a fourteen-hour day. For example, during basketball practice from three to five o'clock in the afternoon, the rest of the high school may be idle. The efficiency of utilization is very low during those hours. In the same way the rate of utilization declines if a six-day week instead of five days, or a fifty-two-week school year instead of thirty-six weeks, is used on the time axis of the utilization chart. Any scheme of charting utilization by area and time will depend for its results upon the time limits to be assumed. While traditional measures of utilization are worthy of substantiation, it is not surprising that educators are chided by businessmen and the public for lack of imagination in the assumptions concerning building utilization that they accept.

Other aspects of utilization deserving mention are long-term utilization and functional utilization. Long-term utilization may be described in general as flexibility to permit administrative variability on the basis of the current educational program and adaptability to probable future changes. A continually evolving master plan of school utilization projected at least ten years in the future is therefore just as important an element of economy as status studies of current utilization.

The functional approach to utilization introduces important issues that educators must examine and evaluate. When, for example, a dress rehearsal is held on the stage of the auditorium, the utilization of the

Determining the Number of Instruction Rooms Needed for an Assumed Program for 500 Secondary School Students

Subject	Daily student periods	Number of sections	Rooms required
English	475	18	
Social studies	375	14	
Mathematics	200	8	
Language	150	6	
*Interchangeable rooms	1,200	46	9
Typing	100	4	1
Distributive education	75	4	1
Art and drawing	100	4	1
Homemaking	150	7	2
Science	225	9	2
General shop	75	3	1
Farm shop and classroom	75	3	2
Special rooms	800	34	10
†Total rooms	2,000	80	19

* If it is desired that rooms be designed especially for each subject, at least one additional room will be required.

† Exclusive of library, music suite, and health and physical education facilities.

In the above illustration there is a utilization-efficiency ratio of from 70 per cent to 75 per cent, as may be demonstrated by projecting an assumed schedule of student periods. During a homeroom period when attendance of the school is taken it would probably be necessary to use the lunchroom and the library as homerooms in order to accommodate all the pupils at once. Homemaking rooms, general shops, etc., are usually not very well equipped for homeroom purposes.

MEANS OF INCREASING UTILIZATION

The preceding sections have reviewed techniques of what may be termed status measurement of capacity and utilization, as commonly reported in school-plant surveys. These status measurements are functions of area utilization and current time utilization, and like most status studies they involve many assumptions as to purpose, adequacy of program, scope of curriculum, community trends, methods of operation, and administrative judgment. An increase of utilization of school-plant facil-

depend upon such a flimsy structure as interdistrict contract tuition for nonresident pupils which may be discontinued at will.

School-district reorganization presents a different problem in the case of a city district and its adjoining suburbs. Sometimes the suburban area makes a satisfactory independent district for the time being. As a rule the main routes of transportation lead to the heart of the city rather than circumscribing it, and thus the small isolated suburban communities cannot link together readily to form favorable consolidations. The city may eventually grow to absorb the suburbs, as has been the history of city growth over the years. For these reasons, school-district organization will often be more satisfactory where a city school district and adjacent suburban districts are at liberty to merge prior to a school-building program. More far-sighted planning and more imaginative layout of sites and buildings can take place where the city district is noncoterminous with municipal boundaries. This is particularly true if the city district has carried a large proportion of nonresident contract-tuition students transported from the suburbs.

Arrangement of Attendance Areas. Within larger districts having several school-site locations, administrative variability is essential to sustain full utilization of existing school plant. In Corpus Christi, for example, the distribution of pupils was shown by means of a spot map. It consisted of a large street map mounted on a bulletin board with residence of each child indicated by a colored pin designating his school and department. School-attendance boundaries were drawn on the map following major streets. New York City, on the other hand, makes use of a school-utilization index obtained by dividing enrollment of each building unit by its rated capacity. These data are imposed on a city map showing graphically where the seriously overcrowded schools are located. The objective is to shift enrollment where possible from overcrowded to adjacent underutilized buildings by attendance-boundary changes.

While these methods meet with considerable success, serious practical problems are also encountered. Overcrowded schools are apt to cluster in certain parts of the city. Parents may be unwilling to have their children change from the accustomed school or object to travel conditions or to social factors of another school. One can think of countless obstacles, natural barriers, intervening traffic hazards, industrial belts, excessive walking distances, undesirability of having families send children to different schools, and the constant friction of making frequent trivial changes for the sake of mathematical uniformity. These difficulties, although perhaps quite solvable one by one, when taken together are so strong that in many cities the administration tolerates badly overcrowded conditions in some schools for long periods of time or until building

auditorium in terms of pupils is rather small, but in terms of functional value it is very high. Many areas of the building, offices, cafeteria, kitchens, spectator seating, foyers, exhibit spaces, heavy machinery stations, etc., attain at times great functional value out of all proportion to known measures of utilization. Outside the building a certain grounds area may be completely nonutilized, yet serve as a buffer zone between the classrooms and the noise from highways and playfields, or for esthetic purposes. The measurement of utilization in terms of pupil stations serves only a partial usefulness in achieving economy of the over-all school plant.

These several remarks are introduced to encourage a wide and flexible viewpoint on the application of utilization measurements. They are not intended to discourage the preparation of capacity measurements or to thwart the maximum application of the principles of space economy. Accordingly, specific remedies against underutilization of the school plant are described in the following sections.

Redistricting the Local Unit. A differentiation is usually made between the boundaries of a local school system for administrative purposes and the boundaries of the attendance areas of the several school units within the district. First attention should be given to the adequacy of the local school-system boundaries. It is poor economy to build extensively on the basis of inadequate district organization. Such building may incur bonded indebtedness on the wrong tax base or result in ill-planned schools that suffer early obsolescence.

The reorganization of rural school districts is progressing so rapidly that soon nearly all rural regions will make use of modern transportation to carry children to consolidated schools. Many of the early consolidated school districts are inadequate and further consolidation may be anticipated. Probably districts with less than 600 to 800 pupils should be permitted only in very sparsely settled regions. Larger administrative units have the opportunity to plan schools of optimum size, but small districts have no choice in the matter. The property-tax base per child in rural areas is generally less than in cities. If the higher costs of small-school size correction were considered, the property-tax base per weighted pupil unit would be bound to be even less. Transportation is itself an added cost that partially offsets the budgetary saving of consolidation.

The case for reorganization of rural schools rests on an improved and more equitable educational program rather than cost saving. The state can share in the finance of new school buildings in reorganized rural districts with greater confidence since it is not called upon to subsidize inefficiency. Neither the state nor the local district should proceed with school-plant construction where the attendance area and the local revenue

utilization that arise because of organizational rather than teaching and learning factors, is the first essential of such economical scheduling.

Modern Use of Transportation. The convenience of modern transportation in school management is well established. But the way that school personnel dwell upon archaic concepts of the "neighborhood school" makes one question if public sentiment in the country may not actually be in advance of current school planning by educators. Since modern habits of transportation in community life generally have become so prevalent, the neighborhood schoolhouse as such may no longer serve as the neighborhood or community meeting place that it used to be. The attitude of the rank and file of people toward school transportation in particular could well be studied scientifically. It can afford a great equalizer for numerous problems of school-plant utilization. The variations of school-building utilization based on pupil walking distances cease to be a factor when transportation is properly applied. The degree of population shifts is unaccountable and the causes of neighborhood fluctuations are most unpredictable. The possible saving in cost of school-site acquisition and in full utilization of the plant is enormous if small area attendance boundaries could be eliminated and utilization of buildings equalized by school transportation.

Community attitudes largely dominate current practice regarding school transportation, and public sentiment, as a realistic factor in transportation, warrants closer inspection. School authorities have to assume full responsibility for a transportation system as they do for other school services. The objectives are safety, comfort, convenience, and good social influences. Management methods in rural school transportation have been successfully worked out, and the costs are consistently budgeted in the rural consolidations. In cities a door-to-door pick-up should not be necessary. However, since the parents of younger children do want to know almost to the minute when the bus will stop at specified stations, a regular schedule will have to be adhered to. Possibly one station for each four city blocks would be entirely satisfactory. Needless to say, high standards of supervision must be maintained.

Parents will find a transportation system more secure and healthful than having children walk considerable distances under all kinds of weather and traffic conditions. Many lesser problems must be attended to, such as keeping the buses in operation several hours a day with multiple tripping, the occasional late return of children to their homes, and confining all trips to short runs that probably need not exceed twenty minutes in cities. If the school site is located well out from the business center of the city, the school buses will be going against traffic and thus be free from traffic congestion in rush hours. It is also assumed that transportation will carry children to modern school sites that are attractive to

additions can be constructed, while other schools remain underutilized. Nearly all report that a public relations program must precede even the seemingly trivial adjustments of attendance boundaries.

The administrative organization can be varied in several ways to permit adjustment of attendance boundaries. The attendance boundaries need not be uniform for all grades, since the older pupils can travel greater distances to school if necessary. The articulation of elementary and secondary schools can be varied, with seventh-grade pupils held back in their present building if it is underutilized and sixth-grade pupils sent to the junior high school if their present building is overcrowded. Many junior high schools contain elementary grades for this reason.

Among the emergency expedients that have been attempted to relieve overcrowding are temporary portable buildings, rented quarters, and kindergarten-primary units in residential housing developments built with a view to later conversion to commercial apartments. The disadvantage of these expedients is the necessity of supervising many isolated units.

Overcrowding is currently a most acute problem in suburbs and built-up sections of cities where natural increase due to higher birth rate prevails. If the overcrowding of schools were a result of large-scale new housing developments, the argument for schoolhouse construction would be causal and logical. But peak enrollments in built-up sections are apt to be followed in later years by a decline of enrollment and resulting idle classroom space. A peak enrollment in the primary school may move to the junior high school almost before the required additions to elementary school buildings are completed. If a system of transportation could be introduced to relieve even a part of the overcrowding in built-up sections, it would allow more elasticity in meeting long-term needs.

Since children in overcrowded schools are not receiving an equal educational opportunity, the school district is bound to provide immediate relief, even though such relief is more costly than longer-term economy would seem to dictate. In some localities there are substandard schools that have been slated for abandonment. It may be necessary to spend considerable money to modernize those buildings so as to handle a temporary peak enrollment, since teaching in a renovated substandard structure if reasonably healthful and safe is better than keeping on with overcrowded classrooms in another building for the sake of building standards alone.

Elsewhere it is suggested that economical scheduling should precede the determination of need for school construction. The fullest possible use of existing plant consistent with educational purposes and good judgment, and especially the removing of any administrative barriers to full

General-purpose room. Elementary schools that house a relatively small enrollment can successfully combine their large group activities in a properly designed and equipped general-activity space. Among the desirable features are (1) a spacious, clear floor area; (2) attractive atmosphere as to fenestration, proportions, lighting, color scheme, ventilation, and acoustics; (3) such built-in features as stage, visual-aids facilities, and food service; (4) adequate auxiliary spaces for storage of stage scenery, seating, tables, and apparatus, and for food preparation; (5) convenient public entrance and separate corridor ingress to both floor space and backstage; (6) proximity of dressing-room space and lavatories; and (7) arrangement for cleaning and rapid conversion from one purpose as cafeteria, assembly, dramatics, or music to another such as free play without undue loss of time during the busy school day. Combining the cafeteria-service and the playroom area is unsatisfactory from a health standpoint; it would be valid only for small elementary enrollments.

Combination auditorium-gymnasium. Among the claimed advantages of this combination are ample economical seating at lower cost and less plot area, a higher rate of utilization as compared with a large separate auditorium, and opportunity to engage in the flexible types of events that can be produced in a combination space. Among the drawbacks are obstructed opportunity for use of stage facilities during physical education and recreation periods, scheduling conflicts between after-school athletics and rehearsals, greater floor wear, poor sight lines for viewing the stage, and frequent periods of time when the combination room is made idle by necessary seating conversion and cleaning. When the enrollment attains such size that physical education classes must be scheduled all day, the drawbacks probably outweigh the gains.

The typical junior-senior high school unit can ease its utilization problems in the large combination auditorium-gymnasium by having a small auxiliary asssembly room especially equipped with stage, seating, storage, and other facilities for limited purposes. This room would be available for dramatics, music, and similar rehearsals, and for presentations to a limited audience. Thus the small school system can build a larger-size combination auditorium-gymnasium in order to accommodate the occasional large audiences than they would feel they could afford in the way of a separate gymnasium and full-scale auditorium.

Multiple use of cafeterias. Although the cafeteria very likely will be scheduled three or four hours a day for food service and custodial care, it can be planned for any of the following alternative uses during its free hours: study hall, group conferences, small assembly, stage rehearsals, community meetings, audio-visual presentations, regular classes, or music

the parents and afford complete facilities for parking and for loading the school buses.

Most cities already have some school transportation, if only for handicapped children. Generally a high school is located with a view to accessibility by public transportation. But only a few so far have developed the economic theory of transportation as a basic means for achieving maximum utilization of the school plant in a long-range master plan.

Multiple Use of Spaces in a School Plant. Since a considerable part of the modern school building is specialized in function, adjustments must be made to allow the use of these spaces for a variety of purposes. Consider the following combinations when a separate facility will not be used a major portion of the time:

Gymnasium—auditorium
Gymnasium—auditorium—cafeteria (in very small schools)
Gymnasium—cafeteria
Auditorium—music or band room
Auditorium—cafeteria
Library—study hall
Music room—stage
Audio-visual room—little theatre—music room
Board room—conference room—principal
Cafeteria—study hall
Cafeteria—stage
Cafeteria—playroom
Combined shops
Teachers' rest room—health room
Homemaking room—classroom
Science laboratory—classroom
Physics laboratory—classroom
Chemistry laboratory—classroom

Equipment manufacturers are aware of this requirement and supply a variety of standardized multipurpose furniture and fittings. But careful advance planning must be given the size, arrangement, and interrelationship of specialized spaces. Even so, not enough originality has yet been shown in planning such spaces for expansibility and probable future changes of enrollment and curriculum. Also, it should be borne in mind when planning multiple use of spaces that efficiency in the use of the instructor's and the student's time is also a major means of economy.

Some typical ways in which spaces may be designed for several purposes, depending for their details upon the size of the school and its program, are these:

layout is important; for instance, if secretarial and business-machine rooms are to be separated by temporary glass partitions, there may be a small office and duplicator-machine room provided in the space between them.

Vocational rooms such as homemaking, industrial arts, and agriculture lend themselves least well to multiple use. Safety demands excess square footage for shop-bench stations. Vehicle ramps, tool storage, and power machinery occupy special areas. The trend in homemaking instruction places a premium on environmental design rather than space economy. The utilization problems are consolidation of work spaces, flexibility, and expansibility. Generally the economy of space must be found in careful intradepartmental scheduling, although certain class instruction spaces may be interchanged with other departments.

High school classrooms other than special rooms will be required to accommodate many different subject classes. Therefore they should have ample display and cabinet-storage facilities and multiuse furniture. As a rule, many small-size classrooms are not adaptable to schedule changes, although again removable end partitions and modular design warrant further experimentation on this score.

Design of administrative spaces. The basic spaces needed for administrative, supervisory, and service personnel in a medium-size school system include offices, board room; group conference rooms, health clinic, mimeograph room, guidance room, public-address-control center, curriculum laboratory, and the like. To some extent these limited spaces can be centrally located in a space that is adjustable to changing needs. Rather than placing administrative spaces in odd corners about foyers, and so on, as architectural leftovers, the known requirements could well be arranged as a suite with changeable partitions, since experience has shown that the need for office space will change drastically over a short period of years. If this suggestion is adopted, the floor and ceiling treatment and especially the partitions should be essentially soundproof. The depth of rooms in the suite ought not to exceed normal utilization, and excess depth could be arranged as waiting rooms, storage, machine rooms, or conference rooms.

Another trend observed is in the provision of offices for teaching personnel—librarian, physical education instructors, cafeteria manager, vocational education teachers, music director, dramatics instructor, student-activity supervisors, and so on. Part-time office space of this character requires careful study; probably the trend is desirable and should be planned in the layout of instructional spaces rather than encouraging the design of nonfunctional areas here or there in a building to which such offices are relegated.

Storage. Since inadequacy of storage more than any other single item is a source of complaint from the users of new school buildings, the

rehearsals, provided the design and equipment are adequate. Therefore some added expense for wall storage, portable equipment, good acoustical and light control, and convenience of location may be justified. The dining area could occupy several functional spaces, using partitions, etc. The operational expense of daily conversion to alternative uses must be considered in the choice of furniture. The ranch-type cafeteria is gaining favor in some localities and more imaginative planning of multiple-area cafeterias may be expected in the future.

Library and study hall. Various objections to counting the library seating as a means of reducing the seating requirements of study rooms can be overcome by good organization and staffing. The trend is toward larger school libraries which integrate with every unit of instruction. To encourage this trend, the seating capacity of the library should be made a scheduling asset. Authorities recommend that the library seat 10 per cent of the weekly schedule, this may be too low an estimate. With use of standard library furniture the minimum square footage required per pupil is less than in regular classrooms, and the objective of arrangement is to lay out the circulating space thus gained in such a way that the librarian's functions will not disturb the study grouping. Experimentation with improved design of the expanded library concept is evidently needed: partial space dividers and doorless plans have proved very successful. It is questionable whether small auxiliary rooms are practical or necessary in a library layout if space dividers are properly installed, but doubtless more planning must be done to achieve functional (and flexible) space separations.

Multiuse and interchangeable use of laboratories and classrooms. Science laboratories have been notably inflexible. The fact that total science laboratory requirements of a building vary from year to year and that the rooms must also be scheduled for other purposes has been generally ignored both in the design of equipment and the provision of service outlets. A possible solution for new construction would be to have (1) removable partitions in a science suite planned on modular design, (2) service outlets from parallel floor or side-wall channels extending longitudinally through the length of the science suite, (3) portable cabinets of uniform dimensioning and work benches attachable to the floor service outlets, and (4) permanent installations and storage located at the lateral walls. Science-room furniture should be portable and lightweight. The need for different furnishings in physics, chemistry, biology, etc., is more imagined than actual. In modernizing the existing buildings multiuse furniture would be preferable from the standpoint of efficient scheduling.

Other instructional areas. Dual-purpose desks are available for art rooms and business education rooms. Arrangement of specialized room

times when they would draw from overlapping sessions. Transportation could be so arranged in a multischeduled day as to keep the school-bus fleet in nearly full-capacity operation all of the time, although some duplication of routes could be expected.

There are no doubt valid reasons why multischeduling is being employed in only a few urban secondary schools. Where even a minority are inconvenienced or discriminated against, the saving in school-plant space seems unjustified. If the overhead is excessive or the use of instructional staff is inefficient, there may not be any saving. If the children are too immature for the responsibilities implied, the system would be a loss. If the parents object to particular arrangements, the plan would fail.

Probably administrators hesitate to limit building plans on the assumption of multischeduling because they are uncertain as to the maximum load at peak hours. They would rather plan to house 100 per cent of enrollment at once. Nevertheless, a review of educational history would show that schools have fallen into their current set pattern of sessions and Carnegie-course units in comparatively modern times. The possibility of finding new patterns of offerings better adapted to the needs of the day is not a closed question; we may see the time when junior or regional colleges merge with senior high schools. The variations of multischeduling can be experimented with on a partial basis in any school system, and in this way growth can be achieved without having to discard traditionalism entirely.

FACTORS IN PLANNING FOR LONG-RANGE UTILIZATION

The demands of the educational program upon the school plant are in a continual stage of evolution and change. The history of school-plant utilization has been one of outgrowing the old and adjusting to the new. The records of many communities over the past fifty years will show primitive elementary schools expanded into graded schools, perhaps evolving at one stage into a platoon system and more recently related to school environs on a self-contained classroom concept; class sizes reduced from forty-five to thirty-five, and then to thirty or twenty-five; new services and auxiliary facilities added as cafeterias, auditoriums, health clinics, special-instruction rooms, transportation systems, administrative suites. Perhaps a few years ago the seventh and eighth grades of the school system were reorganized as a separate junior high school level in a departmentalized secondary school system. Not only will the secondary school enrollment have increased, but the curriculum will bear little resemblance to what was done in 1910 or before. Special activities are found to require special rooms. The length of school term, the utilization

matter deserves particular attention and intelligent planning. Storage may be divided into functional storage closely related to daily use and general storage. From the standpoint of flexibility, a large amount of cabinet storage, rather specialized and of uniform dimensioning, would best serve the need for keeping small articles, equipment, and materials. There is little of daily use in the classroom that could not be stored in properly designed cabinets. In fact, pupil storage cabinets could take the place of storage in desks, if desired. The objection, of course, is the amount of wall space occupied.

General storage should be supplied for building units and for the custodian, administration, gymnasium, stage, vocational shop, cafeteria, auditorium, and so on. Some planners have suggested that the teacher aides be employed to prepare materials for display. Without going into details of the many storage needs, it should be pointed out in principle that good storage facilities save time, and saving time is an essential of utilization.

Multischeduling. For a long while school administrators have looked upon double or triple sessions as a prima-facie evil. That multischeduling, besides reducing the cost of school plant almost by half, could be of actual social and educational benefit has received scant attention. When a student graduates from high school and enters junior college, he goes from single scheduling to multischeduling, and the possibility that he would profit from multischeduling at an earlier age is also worth considering.

A multischeduled secondary school could be utilized throughout the day and in the evening. The traditional units of instruction could be varied to suit the curriculum needs, some subjects as shop or laboratory meeting for two or three hours if need be, other subjects meeting but once or twice a week. The library could be truly the academic study center of the whole school. As to work-experience, a well-managed guidance and placement office in cooperation with industry and business could arrange a continuum of part-time employment schedules interrelated with the school-attendance hours so that some older youth could be employed in the morning, others in the afternoon. For the older youth or adults who work all day, the evening sessions would be available. Since it is true that employment and home study conflict, this adjustment is proposed only for older youth, age seventeen to twenty, and especially those preparing for vocations such as business or industry. As to physical education and mass recreation, the athletics practice on the playfields or in the field houses could go on all the while rather than "after school." No doubt elective course offerings and the variety of school activities could be greatly enlarged to meet more individual needs by use of multischeduling. Class size could be adjusted by offering elective subjects at

into account. But they serve to show that if schools are built permanently for the peak enrollment, a period of underutilization can follow.

The history of attendance in city school buildings reveals a rise and fall of enrollments. For a time the school neighborhood is populated with young families, as is true of many housing developments in city suburbs today, and after a while the enrollment declines. Is this a growing district or a stable district? Should the district build permanently for the peak enrollment? Or should it plan to build for a "normal" enrollment, somewhat short of the estimated peak, as the New York State Building Commission recommends for that state? Could transportation be used to equalize the load on existing buildings of the area? Should the school district temporize with portable buildings or rented quarters while waiting for an enrollment decrease? If so, how will the presently enlarged elementary grades be accommodated in a few years when the children have grown up to high school age?

It is obvious that each local district will have to settle these questions in terms of its particular conditions. There is good reason not to build permanently for temporary peaks. The decision on permanent space needs should be along the main trend or normal average of expected enrollment trend. On the whole, districts have not found portable buildings very practical or economical, but they have found permanent school buildings constructed by low-cost methods to be economical, easy to maintain, inexpensive to operate, and just as long lasting as many far more expensive buildings.

If conservatism and economy dictate that new school space be planned at a level short of the anticipated peak enrollment, how shall the surplus be handled during the peak years without lowering educational standards? A number of interesting solutions have been tried. One procedure is to build some temporary school space with a view to later conversion to residential or commercial use; but it is plain to see that this scheme will be practical only under special circumstances and often is not a cost saving. A second more common general procedure is so to construct elementary schools that later they can be partly converted to secondary school use—which is a matter of very careful planning of site location and design. The campus-type development has this attribute. A third solution is to postpone the abandonment of substandard buildings. City school systems have certain old buildings that are scheduled as obsolescent or about to become so. The useful life of such buildings can, if necessary, be extended until the peak of an enrollment increase has passed.

Is this discriminating against the children in older sections of the city? Not necessarily, if some degree of modernization of such substandard building units is carried out. Since as a rule modernization costs

during the week by day and by evening, and the informal school activities that go on all about in a busy modern high school plant have all changed with the times. A very convincing chart of this process of evolution may be presented as interesting historical background in the report of a community school-plant survey.

Mixed with new demands and new practices are vestiges of the old. The authors recall a recent survey in an Eastern city where at dismissal the children were lined up and marched out of sight of the school and a special detail of police was assigned to prevent vandalism by children returning to the school grounds, which was forbidden. In contrast, the doors of some school plants do not close until late in the day or evening, and the care of the safe place for children is an accepted function of the school at all times. Mort in his studies of adaptability[4] speaks of the pioneer, the early follower, and the late follower. Standard measures of plant utilization may help the late follower to discard outmoded practices. But it is evident that most of the utilization standards now published give little comfort to the pioneer. At best the utilization standards may help the pioneer to distribute class and informal-activity loads over the school week so as to avoid excessive idleness of the school plant at any time of normal usage.

Peak Enrollments as Emergency Situations. Strictly uniform records of utilization are not to be expected. Most schools have seasonal variations with periods of crowded classrooms and periods of less enrollment. In some migratory pupil areas the school may resort to such emergency measures as classes in the auditorium or playroom during peak seasons, or even use of portable buildings or rented quarters. However, if the rise and fall of enrollments were plotted, there might be found a normative trend toward which the school's planned capacity is directed. Furthermore, within a school some special rooms, such as the shop rooms, may be utilized more one year than other.

But when speaking of peak loads, one has reference not necessarily to minor and seasonal variations from normal but rather the major long-range question of the increase and decrease of the large bulk of child population. The New York State Commission on School Buildings estimated that the peak of public school enrollment increase because of the postwar birth rate in that state would be reached in 1960.[5] Forecasts of this nature are based on vital statistics. They do not take population shift

[4] Paul R. Mort, "Educational Adaptability, Part VI, Adaptability Studies and the Forward Look," *School Executive*, vol. 71, no. 10, June, 1952

Donald H. Ross (ed.), *Administration for Adaptability*, Metropolitan School Study Council, Teachers College, Columbia University, New York, 1958.

[5] *The School Building Problem in New York State*, 2d Report, New York State Commission on School Buildings, Albany, N.Y., February, 1951.

New Orleans case. There may be sociological advantages and disadvantages in transporting children out from the congested business areas of cities. At any rate, while it is interesting to speculate on the educational values of one site location over another, a convincing factor is whether schools may be provided most economically by purchasing many neighborhood sites or by acquiring an outlying tract for campus-type development.

The New Orleans report suggests additional economies of design and operation. By making maximum use of the one-story style, there was estimated to be a considerable saving in foundations and construction methods. The schools could be directly related to the out-of-door environment. Several building units might share cafeteria, auditorium, laboratories, shop facilities, and administrative offices in common. Only one maintenance department would be needed for the entire installation. A central warehouse could serve the system. Other mechanical services could be centralized for economy. On an adequate site the several school levels could be separated into independent groupings and yet retain flexibility of interchange according to changes in the grade enrollments.

Those familiar with the underutilization of some existing schools and the overcrowding of others know the difficulty of distributing educational facilities on the basis of both present and future needs. In fact, such relatively unsatisfactory devices as portable school buildings or temporary construction have been resorted to in many instances because of the unpredictability of residential family population. The difficulty of pin pointing future child population by city segments has made it apparent that school-building needs for a city as a whole can be forecast with much greater reliability than for a particular attendance area of the city. Even if the error in forecasting child population by neighborhoods were satisfactorily overcome, there would be left the stern fact of housing cycles that occasion a rise and fall of enrollments in neighborhood schools. The one-family homeowned housing developments in suburban areas of cities may be expected to have peaks and declines of neighborhood child population. The tendency of family population to shift to different parts of the city is a major cause of waste in schoolhousing. The campus-type school plan promises an improved solution to this long-standing problem, since it depends upon transportation which is completely adjustable to compensate for shifts in residence of family population.

Whether or not the trend toward a campus-type plant introduces a final solution to present problems of urban school planning, it does stimulate the exploration of several new areas of administrative variability.

Twelve-month School Year. The proposal frequently put forth by businessmen that schools should operate twelve months a year and six days a week, like industry, takes two forms: (1) that class schedules re-

less than new construction, this expedient is chiefly a matter of economy. The problem is to decide how much one should spend to modernize an old structure that is intended for early abandonment. Such treatment should at least cover safety, sanitation, and environmental factors conducive to good teaching. Some features that would be included in a new school building would have to be omitted under these circumstances so as to tide over the period of peak enrollment.

Since standard capacity measures are not absolute, up to 20 per cent or even 30 per cent excess enrollment often can be accommodated in a building on an emergency basis by increasing class size. Crowding of this sort is injurious to the educational program, but sometimes as an emergency measure it is tolerated until the temporary enrollment peak is passed.

Campus-type Schools as a Comprehensive Solution. Shall the traditional neighborhood-school concept be perpetuated and propagated, or shall a bolder and more revolutionary course be adopted, namely the development of a campus-type school concept patterned to some extent after universities? The decision in the master plan for new sites and new construction will have a far-reaching effect on the architectural design of buildings, the ultimate economy in planning, and indeed the very evolution of school organization and administrative structure. The issue was considerably clarified in a survey report of the New Orleans school district prepared under direction of the supervising architect.[6] Fancifully called a "school village," the essential feature of Colbert's master plan is transportation of children from neighborhoods having inadequate or overcrowded schools to a large and flexible school plant located in the suburbs where unimproved land can be economically acquired. (To initiate the plan, a large plot of suburban land was purchased by the Orleans Parish school board for the proposed new construction.) The existing neighborhood schools with satisfactory facilities are to continue in use, and the new campus development is proposed to take care of building needs occasioned by population increase.

A principal reason for locating new campus-type school plants on suburban sites is the saving in cost of land. In fact, the price of an equivalent plot of land in a built-up section is so exorbitant that the potential saving in cost of site alone, not to mention lower construction costs and other economies, was estimated to more than repay the estimated expense of transportation over a period of many years in the

[6] Charles R. Colbert, *A Continuous Planning and Building Program for the Orleans Parish School Board*, Office of Planning and Construction, New Orleans Board of Education, November 16, 1951. *A Program for the New Uptown Negro Junior High School Prepared for the Orleans Parish School Board*, Office of Planning and Construction, New Orleans Board of Education, August 22, 1952.

arrangement of sessions and vacations would open the way to some desirable revisions of the course of study. If the teachers had adequate office space and conference rooms, they would engage in new and perhaps more efficient methods of teaching on a twelve-month basis. Short-term workshops, field trips, cultural institutes, and project activities would become an integral part of the school's purposes. The possible effects of the quarterly plan for public schools are intriguing, but little actual experimentation has been done so far in this country.

The introduction of air conditioning in school buildings is stimulating a trend toward summertime school activities in many places. Departures from tradition of this sort are mainly on the drawing board at this stage of public school planning; but a real campus-type school development in urban situations where school transportation can be conveniently scheduled may encourage school administrators to seek and to explore opportunities for projecting basic educational programs toward maximum all-year utilization of the school plant.

Community Use of Facilities. The degree to which a school plant is used by the community depends to a large extent upon the social customs and the availability of other community property. In some states, for example, the law permits school districts to build stadiums that will be paid for out of current revenues. According to some community-activity concepts, the school day is considered a time of prescribed lessons for children and all the usage outside of the school day is considered a form of community usage. Thus many informal pupil activities that go on after hours would border upon community use of the plant. Community use is held not to interfere with the essential task of the school. Community use is enrichment of the program and more full use of the school plant. The weight of argument favors expanding the services of the school to children and adults alike, with fullest possible utilization of the whole school plant. The trend toward larger school sites has been noted, and presumably these more spacious sites are to be made available for community recreation. The educational needs of children are considered to be met foremost and community recreation is supplementary.

This raises the question of increased cost and additional facilities required. Experience with planning of school construction has shown that the extra costs to enable adult usage of a school building need be relatively slight. The following additional facilities should be incorporated: (1) convenient public access, parking facilities, and grounds illumination for evening activities; (2) adjacent arrangement of such spaces as are commonly used by adults, with general foyer for ingress; (3) provisions for zonal heating, lighting, and supervising sections of the building during out-of-school hours; (4) convenient location of adult lavatories; and (5) special provisions for storage of Boy Scout equipment, athletics equipment, stage properties, cloakrooms, field apparatus, projection

main about the same but informal school activities be expanded to fill the late afternoon, Saturday, and summer-vacation periods or (2) that school sessions and vacations be scheduled around the calendar, possibly with ten- or twelve-week sessions and quarterly vacation periods. The first proposal is a direction in which American education has moved quite rapidly during the last three decades. The second proposal is a solution commonly found in European countries and may be observed there, although it has not found a popular form as yet in this country, partly because of the kind of compulsory education laws in effect and partly because of climatic conditions.

The rounding out of the school day and calendar year with informal activities is illustrated in sports and other extracurricular activities, summer recreation programs and school camping, extension of agriculture and homemaking projects, summer schools, adult education classes, and manifold community uses of the school plant. If the school term is too overcrowded with activities or talented children cannot take all the electives they wish, the summer period affords an opportunity to schedule them. Agricultural education in rural communities and vocational homemaking programs are good examples of all-year teaching programs. Generally the professional staff engaged for additional duties beyond those related to instructional assignments or for vacation-time duties are paid extra compensation. The custodian and maintenance schedules are adjusted to conform with the increased utilization of the plant.

Often the expanded educational services result in the need for increased school-plant facilities. Seldom does this kind of growth in services and school activities produce any economy of initial outlay for site or construction. However, in terms of gaining more complete and valuable utilization of the school plant for longer hours and during periods when the plant would otherwise be idle, the expansion of informal activities is an economy. As the public, children and adults alike, participate in the increased informal activities of the school, they experience a growing satisfaction with the way the school plant is used; at least, they are unwilling to go back to a closed-door policy. This broadening scope of activity in and about the school is the characteristic pattern of extension toward a twelve-month school year in most parts of the country today.

The second proposal, namely, lengthened sessions and quarterly vacations, probably would not of itself decrease the need for school-plant space, but taken together with multischeduling, it suggests some limited opportunity for space economy. Assuming a continuation of the present time allotment given to formal classes, the lengthened term would permit a shorter school day if desired and greater ease of accommodating two or three general platoons of attendance. In fact, the days of attendance for some types of school work could be alternated. A more flexible

machines, and adult seating. For the most part the adults can use the regular school plant with few adjustments.

Community expectancy regarding use of the school plant has an important bearing upon policy and costs. Were it not for the desire of adults to attend sports events, a small exercise room with ample dressing rooms, as in many schools of Denmark, might serve the basic needs of physical education in many areas of the country where practically all large-scale activities can be held out of doors or under open shelters. Likewise, the desire of the public to attend concerts, dramatics, graduation exercises, and the like largely influence the specifications for auditoriums. Many school-site innovations, such as swimming pools and playfields, are prompted by public interest in joint activities of youth and adults participating together.

Thus a decision must be made as to whether public money shall be spent solely for the state-mandated curriculum or for a full community utilization of the plant. A conservative view holds that the state should rigidly control local capital-outlay expenditure. In support the conservative side points out the risk of overbuilding, or indeed of overoptimism as to probable community usage. A forward-looking view holds that home rule and local initiative ought to control. In practice the financial ability of the school district is most apt to be the determining factor. Probably the state should be encouraged to create in the tax structure enough local tax leeway to give each school district an opportunity to finance, if it wishes, an increased community usage of its school plant and to provide enabling legislation for such local option with a minimum of state *regulation*.

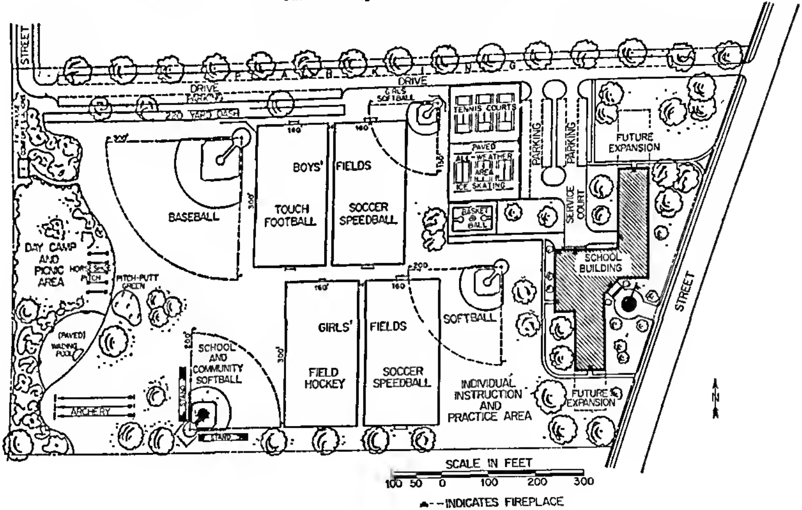
SUMMARY

Published school surveys have demonstrated that efficient, prudent scheduling of building spaces is a major source of economy in school building. The experts tend to base capacity standards on normative practice. This means that many schools are underutilized according to accepted standards. Frequently underutilization is a result of administrative difficulties in scheduling. Since utilization of the existing plant is one of the few controllable factors in school-building economy, it deserves priority in the master planning.

After determining the rated capacity and achieving full-capacity utilization of the available school plant, the next step is to determine the space needs for proposed new construction. This decision should not be reached by rule of thumb on enrollment-forecast figures alone. The school administrator should project realistic schedules showing the anticipated utilization of all units of the proposed new building and encourage the architect to prepare a concise and economical design for such utilization.

The answer to questions of multiple use, interchangeability, flexibility, ex-

Fig. 8.2. Design of outdoor physical education and recreation areas, showing areas for a great variety of activities. Community Park School (Junior High). (*New York State Education Department.*)



RELATED READINGS

Association of School Business Officials: *Report of the Rescorch Committee on Aftcr-school Usc of Buildings,* Bulletin no. 13, Kalamazoo, Mich., 1949.

Belknap, Burton H.: *Thc School Bus,* Educational Publishers, Inc., Philadelphia, 1950.

Castaldi, Basil: *The Road to Bettcr Schools,* New England School Development Council, Cambridge, Mass., 1955.

Conrad, M. J.: *A Technique for Determining the Operoting Copocity of Secondory School Buildings,* The Ohio State University Press, Columbus, Ohio, 1953.

Davies, W.: "Cost Analysis Should Consider Time as Well as Space," *School Executive,* 73:71, October, 1953.

Engelhardt, N. L., Jr.: "Laboratories for Learning," *School Executive,* 74:3, 63–66, November, 1954.

Knezevich, S. J.: "When Are Schools Overcrowded?" *Americon School Board Journal,* 134:46–48, January, 1957.

Mayo, S. S.: "Load, Capacity and Use Factors in Secondary Schools," *American School Boord Journal,* 132:38–39, February, 1956.

McLeod, J. W.: "Storage Cabinet Assemblies as Dividing Partitions," *The American School and University,* 21:221–227, 1950.

Morphet, Edgar L.: *The Measurement ond Interpretation of School Building Utilization,* Bureau of Publications, Teachers College, Columbia University, New York, 1927.

Reeder, Ward G.: *The Fundomentols of Public School Administration,* The Macmillan Company, New York, 1958.

———: *The Administrotion of Pupil Tronsportotion,* The Educator's Press, Columbus, Ohio, 1939.

"Schoolhouse Planning: Portfolio on Corridorless Schools," *Nation's Schools,* 52:53–62, August, 1953.

"Schoolhouse Planning: Corridors—Luxury or Necessity?" *Notion's Schools,* 54:65–72, September, 1954.

Shaw, A. B.: "Trends in Multi-Purpose Rooms," *The Americon School ond University,* 24:279–284, 1953.

Stebbins, R. G.: "Basic Economies in Schoolhouses," *American School Board Journol,* 124:39, June, 1952.

Van Winkle, Harold: "Busiest Building in the Town," *Nation's Schools,* 54:44–48, October, 1954.

Viles, N. E., and others: "Efficient Utilization of School Buildings," *School Executive,* 68:61–74, September, 1948.

Wilson, W. K.: "Techniques for Setting Up a Schedule of Recitation Rooms for New York State High Schools of 400 Enrollment or Less," dissertation, Ohio State University, Columbus, Ohio, 1933.

———: "Planning the Consolidated School for Maximum Utilization," *The Americon School ond University,* 8:31–37, 1936.

pansibility, contractibility, convertibility, and functionality depends upon an exact knowledge of the needs under present conditions, as well as possible variability and trends in utilization that may occur in the future. The possibilities inherent in educational and cultural trends should not be ignored.

The school district should be adequate and well organized to meet emerging concepts of school service. More use will probably be made of school transportation. The campus-type development is especially advantageous for adaptability. Such trends as increased community use and the twelve-month school year cannot be ignored.

DISCUSSION PROBLEMS

1. What selection of furniture would meet the criteria both of multiple use and of functional utilization for each of these areas: English classroom, social studies room, art room, general science room, cafeteria, conference room, typewriting room, home economics living center?

2. In school design what should be the relationship of instructional space to amount of storage area; for example, science equipment, homemaking materials, physical education apparatus, wardrobe space, map and book storage, art supplies, general instructional materials? Does the use of movable cabinet storage decrease the needed square footage for storage space?

3. Illustrate whether size of school site limits the ultimate capacity of the school plant.

4. Is it financially sound to transport students from a crowded school of medium-low-income families to a less-crowded school located in a high-income area?

5. Do neighborhood schools or campus-type school-plant developments attain the greatest utilization over a period of years?

6. Outline a plan for maximum utilization of each of the following areas of the school plant: playfields, music practice rooms, library, auditorium, cafeteria, vocational shops.

7. In estimating the capacity of a school buildiog, how many pupil stations may be assigned the library, gymnasium, auditorium, offices, cafeteria, and specialized rooms such as band, choir, shop, homemaking suite, advanced science laboratories? In a departmentalized program does the number of "homeroom" pupil stations determine the building capacity? If we think of pupils as having "regular" stations and "stand-by" stations, how many stations (in decimals) are required per high school pupil? Which necessary areas cannot be measured in pupil stations?

8. What would be the disadvantages in attempting to compute the capacity of an existing building in terms of arbitrary standards of square footage per pupil, as in the California law (this chapter) for support of new construction?

9. From the standpoint of the social anthropologist, would community use of the school plant be classified as a proper educational function of the school system?

10. Discuss ways and means that the "overcrowded curriculum" may be relieved by more extensive utilization of the school plant.

The pupil in a small secondary school has required more space for an equivalent program. The space needs are much greater for pupils engaged in vocational education, physical education, special education, or project activities.

These activities are so well standardized, it at first seems obvious that if pupil enrollment is estimated by departments the unit need can readily be translated into types of pupil stations as space units. It would not be difficult, however, to imagine variations of the educational program that would seriously alter calculations based upon existing standards alone—for example, the implications of television, work experience, correspondence teaching, or a twelve-month school year.

Functional load. Many services that depend upon local policy have only a very indirect relation to the number of children accommodated: provision for spectators in auditoriums, gymnasiums, or stadiums; recreation, such as swimming pools or provision of large school sites; administrative functions, such as business offices, tax offices, reception areas, or storage; transportation facilities and repair garages; cafeteria, library, and community halls; other special and community services, such as agricultural farms, school camps, and the like.

Adaptability. Changing demands and community relationships call for a school plant that is adaptable. The classrooms alone must have a service capacity for many uses over a period of years, making it impractical to limit their size to the immediate number of children housed in the room.

In many instances the schools being constructed today will outgrow their educational usefulness in ten, twenty, thirty, or fifty years; other considerations than structural soundness may make them obsolescent after a few decades. The very uncertainty of enrollment estimation is of itself a real and vital factor to be reckoned with in the general economy of schoolhouse planning and construction. Estimators are generally aware of this fact and present not only conclusions as to future enrollment but data on community factors that will help to understand such conclusions.

ESTIMATION OF FUTURE ENROLLMENTS

All school-building programs rely in part upon an estimate of future school population. Planning to house a given enrollment is one of the performance standards for the architect. Considerable cost economy is dependent upon accuracy of estimates since either to overbuild or to underbuild may prove costly for the taxpayer and affect the efficiency of the educational program.

The school administrator must have a general method that will project as accurately as possible the trend of future school population. It is im-

CHAPTER 9

Determination of Additional Plant Required

School-building need can be interpreted in part as a service load which the school plant should carry. When the service load exceeds the capacity of the existing plant, there is a demand for additional construction. It is essential that the service load be estimated accurately for future years in order to provide sufficient school-plant capacities.

FACTORS AFFECTING SERVICE LOAD

In public school operation the basic unit of need is the pupil. Not all pupils, however, have the same space requirements, nor are the services of the modern community school always measurable in terms of number of pupils. The geographic location, the particular community services, the scope of school program, and many other facts must be considered.

At least four factors determine the future service load.

Estimated pupils. The number of learners to be accommodated is one of the absolute considerations in planning schools. Hence, it is a primary task to estimate with the least possible error not only the gross enrollment to be anticipated in future years but the age, grade, sex, probable residence, educational plans (public or private school), and departmental trends of such enrollment.

Character of educational program. The changing nature of the program determines in part the service load because different areas of enrollment will constitute different amounts of load according to the planned methods and activities. In the past, secondary school or junior college students have represented a greater service load than elementary school pupils.

working to the same extent, there is no ready-made method of estimation that would give reliable results in all areas. A review of published school-building surveys would disclose that experts vary their techniques and assumptions according to the character of the neighborhoods involved. An isolated rural community, dependent for the most part upon its geographic trading area, may not deviate very far from the general, long-term trend of its population enumeration. But residential suburbs of a city that predominately serve as housing attached to the main city industry will vary in their local population according to the particular desirability of their residential features. Segments within a densely populated city will vary according to land-usage policies, remaining stable, becoming decadent, or perhaps converting to multiple-unit dwellings according to city trends. The possible combinations of circumstances are virtually endless. Each individual situation has to be appraised in its entirety before the major predictive factors can be isolated.

OBJECTIVE FACTORS IN ESTIMATION OF ENROLLMENT

The following check list may serve as a guide in gathering objective data.

CHECK LIST OF OBJECTIVE FACTORS IN ENROLLMENT ESTIMATION

Trend studies and comparisons

1. *Population*
   a. Trends in total population and stratified population (age and sex), district, county, and state
   b. Trend in per cent of population of school age, district, county, and state
   c. Trend in number of resident minors, birth to eighteen years of age
   d. Birth-rate trend, district, county, and state
   e. Racial composition of population, district, and state
   f. Foreign-born white population by country of birth
   g. Number of years of schooling completed by persons over twenty-five years of age, district, county, and state
   h. Rate of net in-out migration
   i. Average family structure per dwelling unit by housing areas
2. School
   a. School-enrollment history for attendance area, district, and state
   b. Trends in nonpublic school attendance
   c. Study of nonresident "feeder" areas
   d. Changes in educational program and policy
   e. Occupations entered by graduates
   f. School transportation policy

portant to know precisely what kind of enrollment information a school-building program requires. A total enrollment projection for the district, which would normally be sufficient for planning a school organization and employing a teaching staff, does not provide specific enough information about place of residence or grade and departmental trends for school-building purposes.

Purpose of Child-population Studies. Fairly reliable estimates are needed as to the probable *residential location* of the future school population. This is evident when decisions must be reached as to school sites, evaluation of available plant, type of school plant, and policies regarding full utilization.

Since school buildings are a long-term investment, the estimates of future enrollment must be as accurate as possible in terms of the immediate decisions to be made. For example, if a certain peak load or if an eventual change in age of school population were forecast within a given school neighborhood, various alternative uses of the school building would need to be anticipated in its original plan.

The procedures of a child-population study should therefore yield direct information of the following types:

1. Anticipated enrollment for immediate requirements (five years)
2. Long-range estimates for planned expansibility, utilization, interchangeable spaces and facilities, retractability (ten years)
3. Segmentation of large populated areas as to where pupils may reside—location of dwellings, population characteristic trends, location of suitable school sites
4. Factors of child population, such as anticipated trends by age and grade groups, attendance at public schools, and probable peak enrollments
5. Understanding of community factors, such as employment, industry, education, and family life
6. Service relationships of the schools to the neighborhoods or community

Source Data for Estimation. The process of enrollment forecasting makes use of all relevant information. Data are required for (1) evaluation of significant community-background factors, (2) projection of statistical records, such as census, school census, preschool census, resident births, housing, economic trends, community characteristics, wider area information, and (3) exploration of special information sources.

Community-background data. The soundness of enrollment estimates, whatever technique is employed, depends upon judgment relative to the various factors that might affect future enrollments. Each locality must be carefully studied to identify these factors and to appraise their relative significance. Since no two communities are likely to have the same factors

of professional school-building consultants as demonstrated by survey reports. Among the basic source data are the composition of school enrollment past and present, the school census, the nonpublic school enrollment, and the resident births. Careful attention is also given to total population trends, housing trends, and economic contingencies.

Assuming that enrollment estimation is a regular function of local school administration, there should be available in the office files of every school district a continuous and systematic record of predictive data and their analysis as discussed in Chapter 5. The minimum list of essential records includes:

1. Summary and analysis of school census, including migration data
2. Annual resident births
3. New residential-dwelling construction—district, town, and county
4. Studies of private and parochial school enrollment
5. Enrollment density by residential sections of pupils attending public schools
6. Analysis by both age and grade of annual changes in public school enrollment; holding power of the high school, etc.
7. Index of school-plant utilization
8. U.S. Census and other wider area comparisons
9. Community setting and total population forecasts
10. Annual "census class" projections for five- and ten-year periods

The development of new trading centers, the migration of young families to new housing developments, the population shifts occasioned by industry, and the natural increase because of changes in birth rate are advance signals of possible need for new schoolhouse construction. The system of predictive records in the school superintendent's office should be sensitive to these community changes.

The records also provide excellent material for periodic school publicity since population analysis is a subject of popular interest. Recognition of future enrollment trend, which is the stimulus of most building programs, ought to be timed as far in advance of the operation as possible in order to encourage adequate deliberation, thorough research, sound policy making, and substantial economy. Usually the predictive records have prompted such recognition before the architect, consultant, and other specialists are engaged.

Time and expense are saved in the long run by keeping the predictive records on school enrollment continuously up to date. Regular channels of information established with government and private agencies, as suggested in Chapter 5, and various sources within the school system will yield significant data. Regular processing of such information can be scheduled at convenient seasons in the school-administration calendar. Should an emergency arise, and the outside help of a school-building

3. Residential housing
    a. Record of new dwelling units, permits, or starts
    b. Ownership of homes, district and state
    c. Demolitions and vacancies
    d. Age, condition, and type of residential housing (summer residences, apartments, transient)
4. Economic factors
    a. Employed workers fourteen years of age and over by occupational groups, city and state
    b. Unemployment trend and potential labor force
    c. Place of employment of wage earners (commutation records)
    d. Effective buying income, quality index, and retail-sales index
    e. Classification of local industries
    f. Commercial units constructed and operated
    g. Business licenses and failures or industrial-stability records
    h. Published business analyses: proposed new business, new transportation, new developments, new institutions
    i. Banking assets
    j. Assessed valuation of district per capita (also for comparable districts)
    k. Tax-delinquent land

Sociological factors

1. Opportunities and facilities for youth
2. Recreational facilities
3. Local traditions and community history; progressiveness and civic pride
4. Trade and cultural service centers
5. Religious composition
6. Community services

Area maps

1. Population density for district (note comparable communities)
2. Dwelling-unit saturation
3. Location of past ten years' residential-housing construction
4. Zoning restrictions
5. Utility extensions
6. Traffic arteries and natural barriers
7. Classification of dwellings by type, age, average monthly rental, etc.
8. Residence spot maps of school enrollment
9. Proximity to large cities, commerce routes, development of surrounding area
10. Land use by school-attendance areas
11. Population shifts within community

Projection of statistical records. The problem of enrollment estimation is simplified by the fact that certain statistics may be depended upon to have high predictive significance. These statistics are the stock in trade

or they may loan aerial-survey maps and economic-development maps—all of which are useful in identifying significant factors that predict population changes.

Having observed the frequent inadequacy of school-district estimates on future enrollment, as well as the inadequacy of source data on which they are based, and the crucial importance of reliable estimation in the school-building program, authoritative sources recommend a special school-building census, such as will be described later in the chapter. They urge for every school-building program a separate and comprehensive study of enrollment, population, and community factors resulting in a special school-building enrollment forecast.

PROCEDURES FOR ESTIMATING FUTURE ENROLLMENT

The school administrator's procedure for estimation of future enrollment is analysis of status information and a short-range projection of past trends: enrollment trends, migration, regional differences in children per dwelling unit, character of dwellings, economic changes, and growth or changes of metropolitan areas.

Techniques of Projection. The school administrator has at his disposal five techniques for projecting factual data:

Simple-enrollment trend. The total enrollment of the school system, or departments or levels of the system, can be projected from past records by means of a simple line graph. This projection is usually compared with an enrollment-trend graph for the nation, the state, and the region to test its reasonableness. Such a local projection may be termed "unrefined" since it omits birth- and age-strata information, preschool census, and contingency factors.

Retention-ratio projection. A far more reliable way to project simple enrollment data is by the survival, or retention, ratio (Figure 9-1). The first-grade enrollment is estimated directly from resident births of six years previously so that the effect of the increased birth rate of the war and postwar period is included. The leading argument is that these children are born and will attend school somewhere.

On the whole the short-term projections, from two to five years, by this method have proved fairly accurate in the hands of experienced surveyors who take proper precautions not to project abnormal statistics.

The mathematical routine of the survival-ratio technique, which can be applied in nearly all school districts, is as follows. Over a series of years, usually five to ten years, there are computed the ratios of first-grade enrollments to resident births six years previously.[1] The series of ratios is then carefully examined for trends and erratic figures. Ordinarily

[1] A moving average may be tested.

specialist or official be requested, a reliable file of data on hand will expedite and greatly simplify the urgent work of planning.

But perhaps of more importance is the advantage to be gained by developing proficiency in school-enrollment estimation on the part of the local staff. At best, if a school district seeks to avoid overlooking important items or forming hasty conclusions from insufficient data, the estimation of future enrollments is recognized as a skilled process, demanding of the estimator more than casual experience. Where enrollment estimation is made a continuous process, the local staff will learn from repeated effort how to gauge the impact of a wide variety of significant factors in the local community.

Special-information sources. The sources of information concerning these factors are reasonably accessible and are regularly used by enrollment estimators. From the local school-district files come census and enrollment records, age-grade reports, pupil permanent records, and a variety of special studies and information on educational policies. From the office of vital statistics in the department of health are obtained records of resident live births, accounts of trend studies, and good leads on the techniques of estimation. From U.S. Census *Population and Housing Reports* and *Current Population Reports*, available in depository libraries, may be obtained a wealth of information about local population, employment data, population density, number of females aged twenty to thirty-nine, as well as general forecasts of total population and the nation's school enrollments, and dwelling-unit characteristics. The research office of the National Education Association and other agencies have published analyses of U.S. Census factors which can be reviewed by a school district wishing to make graphic factor comparisons. The statistics for community, county, state, and nation should be compared.

Reports of the state education departments give both local and statewide trends on such factors as public school enrollments, holding power, and school-entrance ages. Municipal offices are generally a good source for maps showing zoning regulations, land usage, and utility extensions. Tax commissioner's office, county planning board, building inspectors, and the like are usually a source for highway and residential-housing maps, analyses of economic factors, studies of population trends, and building-permit data, as will be explained in more detail in Chapter 11. Real estate agencies and utility companies can be helpful with maps and studies of housing and land usage and general population forecasts. The U.S. Department of Interior, Coast and Geodetic Survey, will supply geodetic maps showing physical features and dwellings. Various independent agencies, research organizations, and commercial firms are usually more than willing to furnish school authorities with their studies of housing and commercial trends, undeveloped lands, and related factors;

The retention ratio from each grade to the successive grade in the following year covers the above factors and also the factors of promotion policy, withdrawals from school, attendance at private institutions, and possibly nonresident admissions to the school system. The entire survival method depends upon the hypothesis that the trend of factors for the *past five to ten years as demonstrated in a series of ratios will hold true* for the next five or ten years. The validity of this hypothesis can seldom be established by the statistical data used in the method itself. Rather the acceptance of the hypothesis hinges on subjective judgment that ideally

book, New York State Commission on School Buildings, 1952.)

6	Ratio to grade 5 one year earlier	7	Ratio to grade 6 one year earlier	8	Ratio to grade 7 one year earlier	9	Ratio to grade 8 one year earlier	10	Ratio to grade 9 one year earlier	11	Ratio to grade 10 one year earlier	12	Ratio to grade 11 one year earlier	Total K-12
74		82		70		71		53		41		35		914
67	.97	79	1.07	75	.91	76	1.09	63	.89	52	.98	37	.90	932
65	.96	75	1.12	76	.96	88	1.17	67	.88	57	.90	46	.88	974
68	1.01	77	1.18	71	.95	88	1.16	73	.83	61	.91	47	.82	1034
83	1.14	90	1.32	79	1.03	90	1.27	81	.92	72	.99	54	.89	1229
94	.98	94	1.13	85	.94	90	1.14	76	.84	66	.81	42	.58	1306
102	1.01	112	1.16	91	.96	101	1.17	78	.87	68	.92	52	.81	1417
	(1.02)		(1.19)		(.97)		(1.19)		(.87)		(.90)		(.79)	
111		118	(1.16)	109		108		88		70		54		1543
132		125	(1.13)	114		130		94		79		55		1657
126		145	(1.10)	121		136		113		85		62		1765
151		135	(1.07)	141		144		118		102		67		1859
177		162		131		168		125		106		81		1939
198		189		157		156		146		112		84		1979
180		212		183		187		136		131		88		2001
178		193		206		218		163		122		103		2005
176		190		187		245		190		147		96		1991

should derive from an exhaustive survey of all pertinent school and community information.

The virtue of the survival-ratio technique of projecting enrollments is its comparative simplicity. With a little practice, a mathematically minded person will discover many variations and adaptations of the ratio technique. Campbell[2] suggested ratios of resident births for groups of years to school enrollments for groups of grades in corresponding subsequent years. New York City has refined the technique so as to apply recorded births in health areas of the city to enrollments of clusters of contained schools.

[2] C. C. Campbell, "Forecasting Problem in School Administration," *American School Board Journal*, 121:27–29, November, 1950.

the average or median ratio of such a series is taken and applied to the known and estimated future annual births as a device for estimating future first-grade enrollments.

For each subsequent grade there is next computed over the preceding five- to ten-year period a series of ratios showing retention from one grade to the next grade in the succeeding year. An average or median ratio is decided upon for the purpose of projecting or predicting one grade to the next in the succeeding years. And thus the enrollments of the respective grade groups are projected step by step diagonally down the table.

Fig. 9-1. Enrollment projection by the retention-ratio technique. (*Enrollment Hand-*

Year of Birth	Live Resident Births (town)	School Year	Grade K	Ratio to grade 1 one year later	1	Ratio to births six years previous	2	Ratio to grade 1 one year earlier	3	Ratio to grade 2 one year earlier	4	Ratio to grade 3 one year earlier	5	Ratio to grade 4 one year earlier
1940	422	1946–47	74	.75	107	.254	86		81		71		69	
41	592	47–48	84	.82	99	.167	88	.82	77	.90	67	.83	68	.96
42	722	48–49	84	.66	101	.140	93	.94	88	1.00	67	.87	67	1.00
43	756	49–50	68	.52	127	.168	98	.97	98	1.05	85	.97	73	1.09
44	626	50–51	116	.78	121	.209	126	.99	114	1.16	97	.99	96	1.12
45	592	51–52	157		149	.252	119	.91	131	1.04	103	.90	100	1.03
46	886	52–53	139	.71	175	.198	142	.92 (.95)	126	1.03 (1.06)	122	.91 (.93)	109	1.04 (1.06)
47	988	53–54	126		196		166		151		117		129	
48	892	54–55	125		177		186		176		140		124	
49	891	55–56	124		176		168		197		164		148	
50	881	56–57	125		174		167		178		183		174	
51	889	57–58	111		176		185		177		166		194	
52	794	58–59	97		157		167		175		165		176	
53	693	59–60	83		137		149		177		163		175	
54	591	60–61	79		117		130		158		165		173	
55	560	61–62	78		111		111		138		147		175	
56	554	62–63			110									

The underlying assumption of survival, or retention, ratios is rather subtle. In the case of the mean ratio of first-grade enrollment to resident births six years previously, several factors besides mortality, which normally averages less than 5 per cent, might apply. In fact, one thinks in the realm of statistics and not necessarily about the same actual children, as indeed is true of all the projection devices. The statistical proportions of first-grade enrollments to resident births reflect parochial and private school attendance, net in or out migration, local policies as to age of admission to public schools, and other hidden factors. The assumption cannot pass unchallenged that any of these component factors may be constants unrelated to birth trends and disproportionate to the general ratios, or even may vary inversely from the ratios.

Total-population estimates. In preparing long-term enrollment estimates for ten years or more in the future the older method of making deductions from a total-population forecast is worthy of consideration at least for comparison with other methods. During the late 1930s when it became apparent that the per cent of enrollment to total population was declining, the method of estimation from total-population forecasts fell into disfavor because of uncertainty as to the probable future ratio of enrollment to total population. This ratio is subject not only to changes in birth rate and number of children per family but also to changes in the average age of total population and changes in holding power of the public schools. A study of minor civil divisions in New York State revealed a shift in per cent of the total population in the five- to fourteen-year age group from 18 per cent in 1930 to 16 per cent in 1940. Even more disturbing is the fact that in 1940 the per cent of total population in the five- to fourteen-year age group as among minor civil divisions of the state ranged anywhere from 6 per cent to 28 per cent.

Probably any deduction as to school population from total-population forecasts would be valid only for fairly large areas and only in terms of broadly estimated average percentages rather than of localized statistics. Forecasts of total population made by reliable agencies will usually prove more reliable than those attempted by school staffs having limited means. Such total-population forecasts generally can be secured from major utility companies, planning commissions, state health departments, and the Federal Census. The amount of child population deduced from such total-population forecasts has to be prorated between the local public schools and other schools. Crude as this type of estimation may appear to be, it is so important a check on the reasonableness of enrollment estimates produced by other means that it should not be neglected, especially for long-term projections.[4]

Housing-unit estimates. A populated region can be divided into residential areas and each section intensively studied for its residential-dwelling trends. Different types of dwellings contain different amounts of child population per dwelling unit. Location and population structure of each neighborhood will have characteristic features in this respect. Illustrated in Figure 9-2 is a status study of child population per dwelling unit based upon school-census records that have been coded according to city sections.

The child-holding power of neighborhoods is an important factor, as shown in communities where multiple-unit dwellings replace one-family structures. There seem to be enrollment cycles in most residential neighborhoods. This phenomenon ought to give some clues concerning probable

[4] Knute G. Larson and Wallace H. Strevell, "How Reliable Are Enrollment Forecasts?" *School Executive*, 71:65–68, February, 1952.

If the future eighth-grade resident enrollments could be established by some acceptable method of estimation, the retention-ratio technique would serve as a useful device for projecting such eighth-grade enrollments to the ninth, tenth, eleventh, and twelfth grades as a means of estimating the future high school resident enrollments separately.

Child-population projection. A fundamental technique of child-population projection is one based primarily on the school census. Professional school-building consultants generally have held that estimation from the projection of reliable school-census data would be the best and soundest method of enrollment forecasting. But also they have recognized the difficulty of time, expense, and diligent oversight that the administration of an accurate census entails.

A method of laying out and projecting school-census data is to record the child population for several years previously by age groups on half-inch-square construction paper.[3] Reading the chart diagonally, ones sees how any age group for a given year compares with that group one year later and a year older. Thus the age groups of the current year may be projected diagonally to estimate the child population by ages for successive years in the future. Essentially the method aims to project the child population by ages rather than by enrollments. From the projected age groups or census classes the estimator deduces the probable future enrollment on the basis of experience ratios. Since this method is applicable only to the resident-child population, the future nonresident enrollment must be added as an estimated plus item.

Migration trends may be determined by a series of ratios obtained by dividing the sum of age eight to fifteen child population for each of several past years by the sum of age seven to fourteen child population for the preceding year. To estimate the probable migration or population shift is, of course, the gravest problem besetting an enrollment estimator. Can any migration trend of child population discerned in the past ten or more years be safely assumed to hold true for the next ten years? Only by possessing a comprehensive knowledge of the community itself and of a multitude of wider area factors can the estimator reduce the risk of error in making this decision.

The projection of actual child population as given by a reliable school-census enumeration is based upon tangible evidence; whereas the method of projection of survival, or retention, ratio derived from school attendance alone seems much more tenuous. The children listed in the school census are living and present now. Presumably they are occupying established housing in the community and will attend school somewhere.

[3] Wallace H. Strevell, "Techniques of Estimating Future Enrollment," *American School Board Journal*, 124:35–38; March, 1952. (Illustrates the census-projection method.)

of land-usage policies would be in order. Some school surveyors have made good use of the concept of possible saturation of the area with family dwellings, which may reach its maximum at 80 or 90 per cent of land improvement. Limited area for new housing construction of a certain class is sometimes taken to indicate that future population growth will expand elsewhere and that schools must follow population spread. Conversely, some housing areas in the larger cities may be blighted by industrial expansion. The vacant dwellings that prevailed in the depression years of the thirties may again recur in congested city areas.

These problems have to do not with the total child population of the state or nation but with the habits of people and where children are likely to reside, which is a very important issue with respect to school-building investment. The need for extremely prudent studies of each individual school neighborhood both as to type of housing and land usage can only be suggested here. In a district where there are few vacant dwellings or local industry plans to expand its employment or building contractors are laying out subdivisions, an estimated quota of pupils per family would be a useful device for contingency forecasting. In another district that has had an aging population and declining enrollment, the abnormally low number of pupils per dwelling may indicate the probability of the housing cycle reasserting itself with subsequent enrollment growth.

Some neighborhoods have specialized housing features, as one- and two-bedroom apartments, that limit the number of children. Certain districts that are "bedroom communities" in the suburbs of metropolitan areas will probably sustain large enrollments, but in other districts having a large proportion of preschool or primary children per dwelling it would be very speculative to assume that the children will remain in the district in like numbers throughout high school. There has not yet been enough investigation to supply general rules concerning the effect of housing on enrollment trends.

Reducing the Error of Estimation. The task of enrollment estimation is not performed well in many districts—at least not as a valid basis for school-building planning. Administrators often are untrained in population study or lack the services of qualified specialists. The prevalent practice is to extend the trend of past enrollments or to project population data on the basis of unsupported percentages. Either practice taken by itself and without confirmation has proved seriously inaccurate. Doubtless what has saved many school districts from making errors of overbuilding as a result of faulty enrollment estimation has been simply their common-sense conservatism.

Among the causes of error in estimation of future enrollment have been inaccurate source data, insufficient information in the school census, projection of abnormal statistics, failure to use techniques that reflect all

peak enrollments in the new large-scale housing developments of cities. The range among minor civil divisions of New York State, for example, in children age five to fourteen per occupied dwelling unit was anywhere from .25 to over 1.0 children, with a median of about .55 children age five to fourteen per dwelling. Great variation may be expected among communities. Extensive study is needed on the question of the likelihood

Fig. 9·2. Analysis of average child population per dwelling unit by typical housing area for a selected district. (*Data from New York State Commission on School Buildings*, 1951.)

Areas Classified by Housing Type	Number of Residential Dwelling Units per Area	Total Children Birth through 17	Number of Children Birth through 17 per Dwelling Unit	Total Children under 5	Number of Children under 5 per Dwelling Unit	Total Children 5 through 14	Total Children 5 through 14 per Dwelling Unit	Total Children 15 through 17	Total Children 15 through 17 per Dwelling Unit
A	590	1,079	1.83	409	.69	509	.86	161	.27
B	1,341	1,856	1.38	786	.59	836	.62	234	.17
C	370	535	1.45	214	.58	259	.70	62	.17
D	690	632	.92	330	.48	272	.39	30	.04
E	337	221	.66	54	.16	117	.35	50	.15
F	177	239	1.35	108	.61	106	.60	25	.14
G	308	165	.54	99	.32	60	.19	6	.02
All Types	3,813	4,727	1.24	2,000	.52	2,159	.57	568	.15

Classification of Housing

A – Old housing, low assessed valuation, predominantly foreign-born white occupants
B – Old housing, low assessed valuation, predominantly native-born white occupants
C – Old housing, low assessed valuation, predominantly negro occupants
D – New developments (since World War II), medium valuation, predominantly native-born white occupants
E – New developments (since World War II), high valuation, predominantly native-born white occupants of professional and managerial occupations
F – Flats and apartments over stores and/or low-rent districts
G – New large-scale apartment houses with medium to high rentals

that an abnormally high or an abnormally low number of children per dwelling will prevail over a period of time in any given type of residential neighborhood.

This question is, however, so strategic to the location of school sites, the size of elementary school buildings, and the economy of school construction that a thorough survey of local housing characteristics would be amply repaid. As a general rule the retention of children in a residential neighborhood may be expected to change more slowly than the industrial and economic situation.

Where residential developments are strongly affected by large centers of population and industry, a survey and study of undeveloped land and

Fig. 9-3. Special school census by dwelling units can be taken with this form modified to suit local conditions. (*New York State Commission on School Buildings*, 1951).

CENSUS CARD

PUBLIC SCHOOL SURVEY

(1) Street________ No._____ Apt. No._____ Sch. Dist._____ School Area______

(2) Type of Dwelling: S D T M O   No. Units_____ Age of Building: UC 1 5 10 20 30 40 50+

(3) Occupancy: O T V   No. Years in Dwelling_____ P T   Previous Address________

FAMILY MEMBERS — CHILDREN

Age	Under 1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
(4) Number																				
School																				

FAMILY MEMBERS — ADULTS

Age	20-29		30-44		45 & up	
(5) Sex	M	F	M	F	M	F
Number						

(6) SCHOOL PLANS

Age	Elem.	H.S.

(9) Remarks:

(7) Number in Family________

(8) Number in Household________

(10) Signature________

(11) Family Relationship________ Enumerator________ Date________

Explanation of Items

(2) Type of dwelling: S–single, D–double, T–triple, M–multiple, O–other (trailer, tourist cabin, etc.). Building: UC–under construction. Circle approximate age of building.
(3) Occupancy: O–owner, T–tenant, V–vacant. No. years in dwelling: P–permanent, T–temporary (previous address shows migration factor).
(4) Age and number of all children from birth through 19 years is recorded, whether attending the public school or not in school.
(5) Family-member information makes census complete.
(6) Optional.
(7) Sum of items 4 and 5.
(8) Other information not included above (lodgers, visiting children, institutional arrangements, etc.).

factors, noncoterminous source data, overlooking community characteristics, depending on a single or unverified method of estimation, and inexperienced forecasters.

The following procedures will help to reduce the error of estimation.

Planning an improved school census and other records. Many districts, notably the faster-growing cities and the well-financed suburbs, are making considerable effort to improve their school census and other source data with resulting refinement of their enrollment estimates. The largest cities have special problems in taking an accurate school census, for example, in densely settled multistory apartment areas.

A preschool-age census would seem to satisfy enrollment-estimation requirements better than birth records. Unfortunately the regular school census as recorded over any usable period of time is often found to be so inaccurate and incomplete as to be undependable for school-building programming, causing surveyors to fall back on retention-ratio techniques based on attendance alone rather than the use of bona fide child-population studies.

Regular school-census methods can be improved by making a complete and accurate canvass from age birth to eighteen (or twenty) years, and by an *enumeration of every dwelling unit* in the district. The "continuous" census file is less satisfactory in this respect than the annual or periodic school census. Needless to say, an adequate census would have to be well supervised. If adequate school-census records were available for the past ten years, they would be a reliable source for estimation of future child population.

The attendance records of the school are usually kept accurately as a matter of legal requirement. However, the information is difficult to interpret as service load unless it gives the average daily attendance by grade (and by age, if possible).

Special school-building census. An improved type of school census can be made to yield additional evidence on the stability of the local population by directly relating certain housing, migration, family characteristics, and school-choice data to the known child population. The form of special school-building-census record illustrated in this chapter has been tested in a large city (Buffalo) as a means of determining school-building need more accurately. This type of enumeration is comparatively inexpensive and especially successful in smaller communities (e.g., Angleton and West Columbia) that have a preponderance of one-family dwellings.

The essential advantage of a special school-building census, besides its form and content, is the exactitute of its administration. A precise count or detailed map of dwelling units is prepared, and careful supervision is maintained to ensure complete enumeration. Every dwelling unit is canvassed by an enumerator. The special school-building-census card

the survival-ratio technique of enrollment projection, much reliance has been placed in recent years upon resident-birth statistics. Such children are already born and will go to school somewhere. They at least will have to be housed temporarily in some school. Considerable refinement of enrollment-prediction data is necessary, however, to assure that they belong in the particular area where the birth statistic is recorded. There usually is considerable discrepancy between local birth statistics and preschool census. One may take the risk of projecting an experience ratio of county-birth data (from the bureau of vital statistics) to the first-grade enrollments of a (component) school district six years subsequently. But this is to assume that county or regional trends are characteristic of the political subdivision which is the local school district. In making a child-population study from school-census data, birth statistics can seldom be obtained for the school district as such, and wider area birth trends must be compared with trends in the one-year-old class of the child population enumerated.

Unless a special school-building census is conducted, the same problem of noncoterminous data usually arises in use of published information on age composition of the population, family size, migration, housing characteristics, economic basis, trends in land usage, and ethnic characteristics. It is always a risk to assume that trends of a county or region will hold true for a school district, unless all correlating factors are shown to be identical.

Independent estimates. In thickly populated areas, where the majority of our school children reside, numerous agencies are engaged in population analysis. These include planning commissions, department of health, business organizations, Federal Census, and major utilities. The school authorities could benefit by encouraging a system of exchange and collaboration among the population analysts of these agencies.

Experienced forecasting. Only conscious exploration and a far-reaching search for up-to-date factual information will protect the estimator against the misfortune of neglecting some obvious community or wider area factor that actually is strategic to his calculations and to the judgment interpretations of his statistical findings. Much of these same data as shown in the check list at the beginning of this chapter will prove a subsequent resource for developing a long-range educational plan apart from the immediate mechanics of enrollment projection. The purpose of basing the techniques of enrollment estimation upon as comprehensive factual information as possible is to reduce to the very least amount the inescapable chance of error in prediction. This is a strong prudential argument for investing adequate time and funds in the most reliable procedures.

Where responsibility for estimating future enrollment falls to the lot of the school superintendent or his office, not infrequently the circum-

may be substituted for the traditional census card (Figure 9-3). The disadvantage of the one-time special school-building census is that it does not show enough information on long-term trends; it is virtually a status study. Nevertheless the need for up-to-the-minute factual information is so imperative that a special census becomes an invaluable adjunct to other sources of data.

Risk in projecting abnormal statistics. There is no technique for making a long-range forecast without estimating future births, future population, or future housing, but for school-building purposes it is important to know the possibilities or probabilities. A review of enrollment estimates published in school-building studies would disclose several avoidable errors. Source data were accepted without carefully examining their accuracy and reasonableness, as when accepting preschool-age census figures without reference to comparable resident-birth records. Economic tendencies were neglected, such as the doubling up of families in dwell-units after the war, or the probability of dwelling-unit vacancies and demolitions in certain neighborhoods. Trends inherent in a series of ratios, as the shifting ratio of enrollment to population, were not recognized. Elementary enrollments were overestimated locally because of speculative reasoning on the sweep of wider area statistics. Studies were not made of the probable future attendance at parochial and private schools. Prior trends were projected arbitrarily without respect to such economic limitations as are imposed by transportation, labor supply, employment in local industry, and probable rate of development in the wider market area. Child population was projected beyond its reasonableness in the light of adult-population forecasts and residential capacity.

Abnormal statistics in the source data have been inadvertently projected. The tendency when reasoning on the basis of resident-birth figures is to overestimate future enrollment in a given local attendance area where the birth rate is abnormally high in relation to the wider area, and to underestimate it where the birth rate is abnormally low. In general, a regression tendency in the statistic must be expected, the projection of any abnormal statistic tending to curve toward the normal projection for the wider region.

Of course, the estimation of future enrollment is never an exact science. Perhaps the best an estimator can do is to make certain of the reliability of his source data, to be reasonably confident that he has not overlooked any available factor of major significance, to understand thoroughly the basic assumptions in the method of projection he has followed, and to test his conclusions against all the evidence. He should follow several methods of projection and *be sure his findings are consistent.* He should look outside his community as well as within it and be able to explain any variation of his conclusions from the wider area trends.

Use of noncoterminous source data. As was noted in the discussion of

Segmentation of Child-population Estimates. Experience with built-up local attendance areas has shown that enrollment increases tend to reach an ultimate peak, followed by a decline. If the total population of a metropolitan region continues to grow, the over-all impression may be one of moderate recessions of school enrollment followed by further increases. But closer examination of the school neighborhoods within such a growing metropolitan region will disclose rather sharp peak enrollments and abrupt declines. For this reason the enrollment projections for school neighborhoods cannot simply be inferred from past enrollment records. The probable amount and timing of the peaks must be forecast in order economically to construct schools at a regular or normal capacity somewhat less than the anticipated peak enrollment.

Since enrollment projections can be prepared for a segment of a district as well as for the district as a whole, the segment-enrollment projection may be presented in comparison with residence-factor maps. An analysis of community factors should likewise be prepared by segments of the city. The study of children per dwelling unit is enlightening in this respect. In large metropolitan areas the information obtainable for census tracts, health districts, and similar governmental units is very valuable in producing a study of the population dynamics of school neighborhoods. This has been demonstrated in school-plant surveys of New York City, San Francisco, and other large cities.

Senior high school enrollment projection is complicated by a number of indeterminate factors:

1. The age at which pupils leave school is not stable (termination may be at graduation, after graduation, or before graduation).
2. There may be changes in nonresident attendance, nonpublic school attendance, or the attendance boundaries.
3. Community features are in process of change, including acceptable age of entering employment, demand for higher education, opportunities for higher education, the effects of technology and urbanization, popular desire for culture, and use of transportation.
4. School organization has changed, including vocational education offerings and guidance, establishment of regional high schools, part-time attendance, adult education, and more emphasis on universal education and youth services.

The general method is to project past experience by the retention-ratio technique as a conservative estimate. But a school-census study is almost indispensible to determine the *potential* high school enrollment. Special attention must be given the boundaries of the attendance area that a senior high school proposes to serve.

Supplementary Analysis for School-site Selection. In Chapter 11 the techniques of school-site location will be studied, including the preparation of detail maps such as spot maps of pupil residence, location of new

stances are such that he would be justified in engaging a specialist to verify his conclusions as an economy measure. The specialist may also render an important service by assisting local authorities to organize in the superintendent's office a regular system of child-population analysis.

One of the chief reasons why professional consultants, whether from private or public agencies, are called upon to survey the school-building needs of a community is their skill and experience in estimation. School administrators could profitably study the published school-building-survey reports prepared by such specialists, which describe in detail the methods of estimation employed. Certain architectural firms now include an enrollment study among the services stipulated in their contracts, although authorities generally advise against complete delegation of this survey function to a school architect. The most favorable policy, except in very small districts and unusual cases, seems to be for the administration of the school district to conduct the enrollment estimation, with advice and counsel of a qualified specialist.

Arriving at a balanced judgment. Various techniques of enrollment estimation may produce somewhat different conclusions. The problem is to decide which conclusion to accept with confidence. The projections can be overlaid on a graph, and a shaded portion of the graph can represent the margin between the probable maximum and minimum enrollments as derived by proportion from the most reliable forecast available of the total population. The findings of a census class or a retention-ratio technique of enrollment estimation, when plotted on the graph, should fall within this shaded portion.

It is recommended that estimates of future enrollment be prepared for five and ten years hence. Considering that the elapsed time between early discovery of need and completion of a new school plant is generally about three years, the three- to five-year enrollment estimate ought to be very exact. This estimate represents the pupils to be served upon initial occupancy. It indicates the minimum classroom space needed in the immediate future. The ten-year enrollment estimate is no less important, although it may and probably will be less exact. An error of 10 to 20 per cent would be reasonably acceptable in a long-range forecast, since that much flexibility at least is to be found in the space and capacity estimation considered elsewhere in the planning.

SPECIAL PROBLEMS IN POPULATION STUDIES

At least three types of special information are peculiar to school-population studies for the purpose of school-plant planning: (1) estimates for attendance areas within the school system, (2) analysis of school-site location, and (3) provision for contingencies that might necessitate later expansion or conversion of the building units.

3. Getting maximum utilization out of existing plant by transporting children to underutilized buildings and deferring the construction of neighborhood schools

4. Building several smaller neighborhood elementary schools in a city (perhaps 300 enrollment) instead of larger schools on the theory that the smaller buildings are easier to adapt or dispose of in the event of declining enrollments

5. Maintaining flexible attendance-area boundaries and flexible grade organization to permit maximum utilization of all accessible school plants

6. Adapting the architectural plan to the philosophy of providing durable service facilities for the community needs (auditoriums, gymnasiums, libraries, etc.) and constructing classroom units only as actually needed

7. Using temporary, rented, or loaned facilities

8. Enlarging the attendance area by building campus-type schools instead of small neighborhood schools

SUMMARY

The economic and residential styles and customs of the nation in the distant future are not easy to foresee. Trends toward urbanization of the population are countered by other trends toward suburbanization. Some regions are booming. The center of population of the United States has moved steadily westward. The change on the whole takes place rather slowly because people tend to abide with the geographical location of existing residential structures and economic factors of industry tend to bring employment to those centers where homes are already established and labor is plentiful.

An enrollment projection on which the service load is estimated should be rather conservative. Particular attention must be given to the accuracy of the short-term forecast because the classroom or pupil-station recommendations will be put to an early test at the time of initial occupancy. If there is any doubt about the reliability of the estimate, the building should be designed for expansibility or ample flexibility.

The short-term forecast is in terms of such realistic items as preschool census, children already born, and measurably significant community factors. Therefore this estimate need not be speculative unless very abnormal statistics were employed. A short-term enrollment estimate covers elapsed time from the commencement of the initial studies to occupancy of the structure. The three- to five-year estimate is the means of planning for immediate classroom-capacity needs.

The long-term enrollment projection advises the school authorities of the probable timing and volume of more remote plant-capacity needs. A ten-year estimate or more is necessary when planning the location and orientation of the structure on the site and when laying out the heating or other utilities for future expansion. The longer-range estimate will be utilized in determining service load for cafeteria, auditorium, play areas, or other special facilities.

residential units, highways, land usage, and zoning. Obviously the enrollment estimates have a direct bearing, even though the final decision may be to use school transportation. The statistical data should show areas of population density. Often the enrollment studies should be segmented into Federal census tracts for comparison with population, housing, and land-usage data.

Reliability of Estimates. Longer-term estimates are used in selection of school-site locations, in planning the amount of space needed beyond the immediate future for special facilities, such as cafeterias, auditoriums, playgrounds, administration spaces, libraries, and the like, and in providing for flexibility and expansibility of school-plant design.

Long-range estimates are also needed to determine optimum length of bond issues, changes in district boundaries, patterns of high school organization, and potential functions of the public school system. They are part of the programming yardstick by which decisions are taken as to needed quantities of school-site space, needed revenue for attaining acceptable educational standards, and probable timing in erection of future school buildings.

Use of Contingency Estimates. Long-term enrollment estimation is subject to uncertainty as to future birth rates, migration, and economic changes. At best it may be stated as a given projection plus or minus certain contingency estimates. The estimator is obligated to anticipate possible contingencies and calculate their probable effect on the projection. The *normal* projection is that reasonably assumed by extension of known factors. A *contingency* estimate tries to appraise the probable effect on school enrollment of such possible events as housing development or industrial change.

Hedging against Possible Error. The degree of error to be found in published reports of ten-year estimates of enrollment is commonly as high as 30 per cent. Methods of reducing the amount of such error would be very desirable. It is necessary, however, to plan schools in terms of the probability of a large degree of error in enrollment estimation, since community factors are not always predictable. The longer the range of estimate, the greater becomes the risk of substantial error. Yet the degree of probable error of forecast can be utilized as a factual item in practical school-building planning.

The possible or probable variability of forecast can be compensated at least partially by including the following kinds of flexibility in the school-plant plans and in their administration:

1. Designing school buildings to be used in successive stages for elementary, junior high, and senior high school grades
2. Designing immediately needed school buildings for later conversion to municipal, commercial, or industrial use

Caudill, William W.: "How Many Children Will Be Served?" *School Executive,* 70:68–73, October, 1950.

Chamberlain, L. M., and A. B. Crawford: *The Prediction of Population and School Enrollment in the School Survey,* vol. IV, no. 3, Bureau of School Service, University of Kentucky, Lexington, March, 1932.

Coleman, Basil T.: *Population Analysis and Anticipated School Building Needs of the Bronx, 1945–1965, by Health Areas,* Director of Housing and Business Administration, Board of Education, City of New York, 1946.

Engelhardt, Fred: "Forecasting School Population," *American School Board Journal,* 70:48 ff., April, 1925.

Engelhardt, N. L., N. L. Engelhardt, Jr., and Stanton Leggett: *School Planning and Building Handbook,* F. W. Dodge Corporation, New York, 1956.

———, and S. Leggett: *Report of the School Building Requirements of San Francisco,* Board of Education, San Francisco, Calif.

Hausser, C. C.: "How Accurately Can Engineers Predict Future Population Growths of Cities?" *American City,* 39:124–126, September, 1928.

Hedlund, P. A.: "How to Estimate Future Public School Enrollments," *American School Board Journal,* 120:27–28, February, 1950.

Herrick, J. H.: "Estimating Future School Enrollments in Rapidly Growing Communities," *Education Research Bulletin,* 31:92–94, April, 1952.

Linn, Henry H.: *The Report of the Survey of the Building Requirements of the Public Schools of Nutley, New Jersey,* Institute of Field Studies, Teachers College, Columbia University, New York, 1949.

Mitchell, Donald P., and John E. Tirrell: "Prediction of Enrollments Includes In-migration of Pre-school Children," *Nation's Schools,* 56:43–45, August, 1955.

New York State Commission on School Buildings: *Classrooms for How Many? Enrollment Handbook,* Albany, N.Y., 1952.

Strevell, W. H.: "Techniques of Estimating Future Enrollment," *American School Board Journal,* 124:35–38, March, 1952.

Where a school district keeps an accurate census of school-age and of pre-school children, these estimates can be prepared annually. Such data lend themselves to graphic representation; supplemented with the other studies of community factors, they furnish an excellent means of popularized publicity on the trends in educational need.

DISCUSSION PROBLEMS

1. In many school districts a part of the scholastic population attends private and parochial schools How may exact information be obtained as to past and probable future trends of nonpublic school attendance?

2. Describe some major contingencies that could affect the reliability of an enrollment estimate based on past enrollment and census records.

3. From what sources can population and housing studies be obtained for your community? How should reports of these studies be filed in the school administrative records?

4. What department of a city school system should be given the responsibility for continuous study of enrollment trends and related factors for school-plant planning?

5. Devise a plan for segmentation of the school-census records of a large school district. What data should be included in the school-census record for purposes of the school-building program? How can housing maps be used to ensure complete coverage of dwelling units in a periodic school-building census?

6. Demonstrate that the boundaries of a school district must be well established before reliance can be placed on the enrollment projection. Under what circumstances could a dependable estimate of future nonresident attendance be made?

7. Illustrate ways that the data of school-enrollment studies (and of related community factors) can be represented visually for public information.

8. Examine several published reports of school-building surveys to see how suburban areas are treated differently from downtown metropolitan centers.

9. Obtain, if possible, the enrollment data by grades of the public school system in your community, and prepare a retention-ratio projection. What limitations did you encounter?

10. How important are estimates of future enrollment and related data at the beginning of a study of long-range building plans?

RELATED READINGS

Board of Education: *School Building Requirements of the West Columbia School Area*, West Columbia, Tex., 1958.

Bureau of the Census: *United States Census of Population (1950)*; vol. I, "Number of Inhabitants," vol. II, "Characteristics of the Population," U.S. Department of Commerce, Washington. (Refer also to *United States Census of Housing (1950)*, several volumes; and to special reports and publications on Population of Standard Metropolitan Areas.)

steps which have to be taken in advancing a project to occupancy and use.

LONG-RANGE-PROGRAM FORMULATION

The superintendent of schools and his staff are primarily responsible for recommending the long-range solution for the school-facility needs of the school system. The kinds of questions which he must be able to answer in formulating long-range-program proposals are summarized in Chapter 5 under the heading "Long-range Plans and Finance" in the outline of studies. The list was not meant to be exhaustive; it was merely suggestive. Other questions will be suggested by the various studies.

In the course of the participatory approach (Chapter 2) or of preparing the school board for program consideration the superintendent should prepare or have prepared a series of reports based upon the major technical studies. Where a specialist is employed, he might be asked to prepare many, if not all, of such technical reports. These, after presentation, should be entered in the minutes for future reference.

CHECK LIST OF TOPICS FOR REPORTS

1. Appropriate school-building standards for the community
2. Evidence of need for or possibility of change in the curriculum, methods, or scope of the education program
3. Explanation of community or school-district organization factors that may have a bearing on building needs
4. Data indicating that the school plant requires attention, such as inspection reports on the present school plant, building-utilization studies, school-census trends
5. Report of a survey of school-plant requirements
6. Recommendations on employment of specialist personnel
7. Long-term revenue and district-credit reports
8. Transportation program of the school district
9. Participation of staff and public groups in planning
10. Performance goals for the architect prepared by staff
11. Special features in a proposed plant expansion
12. Studies of school-site adequacy
13. Enrollment estimates and their proper interpretation
14. Possibilities of increasing the capacity and utilization of existing facilities
15. Various means for providing required facilities other than new construction
16. Possible ways of hedging against errors in long-range enrollment estimates
17. Methods of handling peak or temporary enrollment increases
18. Factors which affect the long-range utilization and usefulness of school buildings

CHAPTER 10

Program Formulation and Project Sequence

A long-range school-building program representing the proposed solution of the total school-facility needs of the school system is developed upon the basis of the studies discussed in the preceding five chapters. Presumably every possible solution has been identified, carefully analyzed, and all but the best rejected in view of all pertinent considerations. The result is a plan for ultimate disposition of or changes to be made in each available facility and a generalized plan for new projects in terms of approximate location, grades served, size, and major facilities. Such plans are very flexible and adaptable in terms of future developments. Certain decisions even may be left for future determination because of known trends and developments or of various uncertainties.

The studies and planning needed to identify total needs and to recommend sound long-range solutions require considerable time. At least a year and possibly two should be allowed for this step where it has not been completed. Time should be allowed for reviewing, bringing up to date, and modifying a long-range program completed in the past before attempting to select particular projects for recommended action.

Before recommending particular projects in the long-rang program for advancement, the school administrator should formulate and propose priorities or criteria for selecting such projects. He should study and evaluate the factors which determine ability to proceed with a project. He should weigh very carefully all pertinent considerations before proposing action. He should have a clear concept of the general scope of the project which he will recommend. He should prepare himself for the

Maximum utilization. Facilities should be expanded only after every possibility of increasing long-range capacity and utilization of available satisfactory facilities has been investigated. These possibilities are discussed in Chapters 7 and 8.

Temporary versus long-range solutions. Data on housing trends, aging of population, migration, and nonpublic school attendance should be carefully analyzed to determine the probability of the enrollment declining from some previous or future peak. Solutions for the total facility needs in such instances should either be temporary or the facility should be planned for some other long-range need after the enrollment drops.

Probability of error. It is impossible to estimate school enrollments with any degree of accuracy for the useful life of a new school facility. Long-range plans provide hedges against the wide margin of error in long-range estimates, as suggested in Chapter 9.

Probability of change. As shown in Chapter 1 the need for school facilities as related to educational theory and practice is subject to change because of such factors as national and community values and needs; changed social and economic conditions; research, experience, and experiment in education; and faculty changes. Long-range plans must be flexible and adaptable, permitting ready and economical adjustment of the facility to new or changed functions.

General versus specific plans. Long-range solutions to school-facility needs serve their purpose better if they are defined in general terms—the general location, the approximate capacity, the type of facility, the functions to be served, and the kinds of rooms to be provided. Since conditions may change or new facts become available before construction is started, detailed planning may prove to be very wasteful at this "master-plan" stage.

Tentativeness. The study of trends, the community, and other background data will suggest the possibility of changed needs for the community as a whole and for particular neighborhoods or attendance areas. In such instances certain solutions suggested in the over-all long-range plan will be tentative, subject to review and modification as the probabilities become more evident.

Thoroughness. Long-range plans should be supported by thorough analysis of all pertinent facts revealed by the studies. Other solutions which were considered should be listed and the reasons for their rejection carefully substantiated.

Community development. Long-range planning aims to avoid duplication of community or neighborhood facilities. The school makes full use of available or projected community facilities. The school plans certain of its facilities for community or neighborhood use.

Such reports will serve as a very helpful resource in long-range-program planning. This cannot be completed until all studies are completed. The fact that each study depends upon the others should be stressed in such preliminary reports. This will prevent hasty decisions and will develop an attitude of weighing one set of facts against another in developing and considering programs.

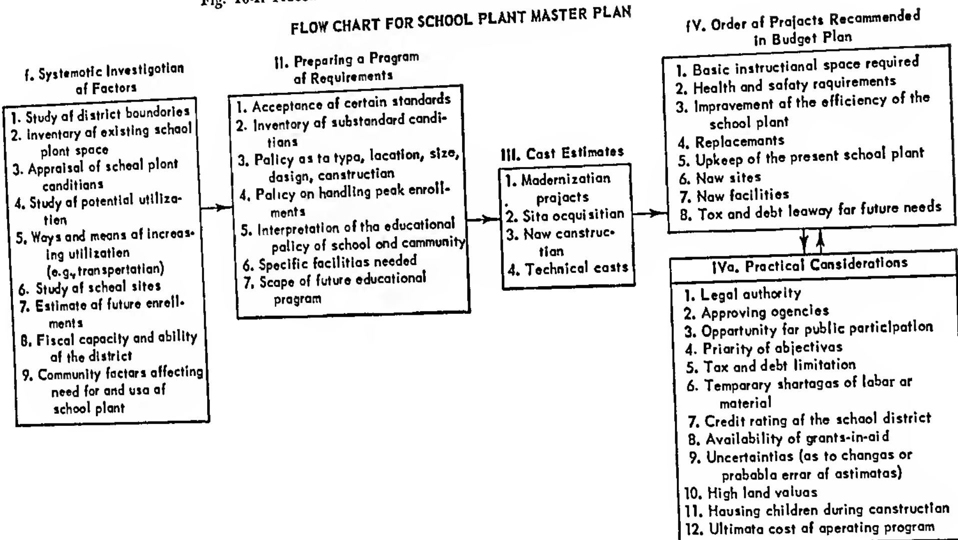
Once all of the facts are available on future enrollments by areas, on the survey of existing plant, and on the studies of capacity and utilization of available facilities and sites, the staff is ready for the first phase of long-range planning—the testing of various possible solutions to the needs as revealed by studies of the community, the educational program, and appropriate school-building standards. Possible solutions for various types of problems were discussed in Chapters 7 through 9 preceding. These should be regarded only as a starting point in the analysis. Other possible solutions should be sought from all participants in the studies or planning.

Identifying the most promising solution to each of the long-range needs of a community is not a mere job of fact finding. It requires the utmost inventiveness or creativeness. It is an activity in which the layman may have a better idea than a specialist or an educator. Thus this phase of planning lends itself best to the participatory approach. However, the experience of specialists can prevent lay participants from wasting time. Certain principles of planning on the basis of factual studies have been developed out of such experience. These principles, summarized below, should guide the formulation of a long-range school-building program.

Principles of Long-range Planning. *Conservation of values.* Land or facilities should not be abandoned in a long-range program until it has been demonstrated that no economical use can be found. Past or future population trends may indicate that a facility is not or will not be needed for its intended purpose on the particular site. If the structure is physically sound or if the land cannot be disposed of at a reasonable price, the challenge is to find another long-range use for the facility or the land which will meet a real need and release space or resources to fulfill other space requirements. A site or facility which is unsuited for one school purpose sometimes may be suitable or often can be made suitable for some other need.

Enhancement of values. New construction may not be required by the fact that a site or a facility fails to meet certain standards. Certain site conditions may be corrected by the purchase of additional land or other site improvements. Rehabilitation and/or modernization and/or additions should be studied as means of correcting the deficiencies as suggested in previous chapters.

Fig. 10-1. Procedure in developing an over-all master plan for school building.



Completeness. The final test of the long-range program is the extent to which it contains a solution for every school-facility need which the community and its school board have agreed upon.

The process of planning a long-range school-building program is summarized in Figure 10-1.

PROGRAM DOCUMENTATION

The records of a school-plant program may be found in the following categories: (1) staff studies and surveys, (2) proceedings of the board of education, (3) legal documents, (4) financial accounts, (5) school-plant-progress records. Categories 3, 4, and 5 will be discussed in Part Three.

Staff Studies and Surveys. Clearly worded, well-illustrated, logically documented written reports have proved a major factor in establishing support for and confidence in the program recommended. Such reports when carefully prepared are a constant source of reference. They are basic for publicity releases and essential to the architect's planning. The survey data and proposals may have been bound in a published report, especially where an educational consultant has agreed to render that service, or they may need to be indexed and documented from materials in work files and reports to the school board.

A well-documented long-range program contains information and recommendations that may be classified as follows:

1. Educational needs
   a. Philosophy, methods, and needs based on school and community evaluation
   b. Proposed departments, curriculum, and utilization of plant
   c. Educational facilities required
2. School-facility facts
   a. Estimated enrollment, allowing for boundaries, transportation, population changes
   b. Evaluation of present school plant, including standards, capacity, utilization
   c. School-site evaluation
3. Proposed solutions
   a. Plans for existing facilities
   b. New projects
   c. Other solutions considered and reasons for rejection

These data may appear in studies prepared by the school staff, published reports, and reports of the superintendent to the board. The preliminary studies are difficult to file where the continuous-type survey is carried on because its approach or basis keeps changing; in fact, the

April 12, 1950

Public School 32, The Bronx, Modernization
Program of Requirements

First Floor

1. Provide new custodian's office in S.E. corner of north building.
2. Remove existing partitions where necessary in north building to enlarge playroom and provide lunchroom.
3. Provide vacation teachers' office in N.E. corner of north building.
4. Provide female helps' toilet and dressing room adjacent to vacation teachers' office.
5. Provide lunch kitchen, dishwashing room, and storage room adjoining helps' toilet.
6. Provide drinking fountains in lunch and playrooms.
7. Provide new boys' and girls' toilets in N.W. corner of north building.
8. Provide piano enclosure in playroom.
9. Remove heating ducts where necessary.
10. Remove light trough on auditorium platform and repair platform where necessary.
11. Replace broken and defective opera seats where required.

Second Floor

1. Convert Rooms 201, 202, 203, and present teachers' toilet into two (2) kindergartens.
2. Convert assistant principal's office into boys' toilet.
3. Change existing office on north wall of north building to teachers' rest room with toilet.
4. Change Room 210 into medical suite.
5. Create new girls' toilet in present office adjacent to Room 210.
6. Install new men teachers' toilet adjacent to girls' toilet above.
7. Convert Room 207 into a general office.
8. Convert Room 205 into principal's office with toilet.
9. Provide boys' toilet in N.E. corner of south building.
10. Relocate library to Rooms 315-317.

Third Floor

1. Convert existing teachers' lunchroom into teachers' rest room with boys' toilet adjoining.
2. Change matrons' room to office.
3. Provide a nature study and science room where Room 305 and supply closet now exist.
4. Relocate teachers' lunchroom in present Room 310.
5. Convert book room into girls' toilet.
6. Locate library in present Rooms 315-317.
7. Locate assistant principal's office in S.E. corner of south building.
8. Create a remedial room in part of Room 315 adjacent to new library.
9. Locate storeroom in S.W. corner of south building.
10. Locate visual aids in Room 303.

expression "continuous survey" is almost a contradiction of terms. The sounder method is to cultivate a continuous collection of basic source data, with consequent improvement in reliability of the methods of obtaining and processing such data, and then conduct a periodic survey or evaluation using such improved source data and other kinds of information as may be dictated by the times, the conditions, and the public interest. The techniques of periodically reappraising school-plant requirements are very advanced and rank professionally with other engineering and designing skills of school-plant development (Figure 10-2).

Fig. 10-2. Program of requirements prepared by the school administrator for a modernization project. (*Board of Education, New York City*, 1950.)

April 12, 1950

SUBJECT: Public School 32, The Bronx
Program of Requirements for Modernization

TO THE BOARD OF EDUCATION:

Gentlemen:

The Superintendent of Schools recommends that Public School 32, The Bronx, located at 690 East 183rd Street and Cambreling Avenue, be modernized in accordance with the attached "Program of Requirements" as an elementary school accommodating pupils from kindergarten to and including the sixth grade.

The school consists of two (2) wings. The original north wing, a five-story "A" structure, constructed in 1899, is located on 183rd Street. The west wing, a three-story "A" structure, constructed in 1918, is located along Cambreling Avenue. A swimming pool joins both structures on the first-floor level, and there is a connecting corridor on the second floor.

The program for Public School 32, The Bronx, provides for modernisation of the educational facilities, including regular classrooms, special rooms, medical suite, library, gymnasium, auditorium, administrative spaces, lunchroom, and kitchen. It includes the repair and modernisation of the structure and the electrical, heating, and sanitary systems, including the swimming pool and auxiliary spaces.

The recommendations set forth in this program were made in agreement with the Principal, Assistant Superintendent, and local representatives of the Health Education Department, Division of Community Education, and have the approval of Miss Regina C. M. Burke, Associate Superintendent of the Elementary School Division. The fiscal authorities cooperated in determining the scope for this project in the preliminary stages through representatives of the Director of the Budget.

This project has been carried as Item No. 22 on the Capital Outlay Modernization Program for 1950 at an estimated cost of $594,000.00.

Respectfully submitted,

William Jansen
Superintendent of Schools

Prepared in the Division of Housing
and Business Administration

George F. Pigott, Jr.
Associate Superintendent of Schools

Proceedings of the Board of Education. Perhaps the most important single record in the course of a school-plant program is that kept in the minute book of the board of education. Here is duly recorded by the clerk of the board the proceedings of all regular and special meetings of the board, including reports, discussions, and resolutions, and also the complete records of school-district meetings or elections. These minutes constitute not only the legal record of school-board meetings and of the business transacted at them, but also a valuable index to almost all the documents to be preserved as a progress and legal record of the school-plant program. Many years afterward, the school-board minutes may be all that is left of numerous informative records. Consequently the minutes ought to contain brief descriptive remarks explaining names, places, events, and essential facts, besides detailed reference to filed documents by their number and date (refer also to Chapter 13).

PRIORITIES FOR PROJECTS IN PROGRAM

The selection of particular projects in the long-range program for immediate consideration implies that these are the highest in priority. Such projects should meet the most critical needs of the school system as a whole. They should represent the wisest course of action toward the attainment of the long-range program. This course of action should flow from a critical analysis of all other courses possible at a given time. Yet without a firm basis for establishing priorities, certain other considerations may influence the decision to proceed with particular projects. Among these are local area pressures, projects with strong popular appeal, the personal preferences of the superintendent or the school board, compromises among individual neighborhoods, the growth of enrollments in particular locations, and competition with or imitation of surrounding school systems.

Guiding Principles. Probably no one could suggest a system of priorities which would be acceptable to every locality. Whatever system is adopted will be conditioned by the sense of values and insights of the particular community. The principles summarized below may prove to be useful in securing community agreement on priorities:

1. Spaces to accommodate increased enrollments may have a high priority, but this may apply only to the minimum of high-utilization space where other high-priority needs exist.

2. Seriously substandard conditions in high-utilization spaces in existing facilities may have a higher priority than desirable auxiliary spaces in new projects. Where this condition exists, it may be necessary to undertake certain parts of new facilities later in the program. If this is necessary, both the site and the facility should be planned for this development.

Fourth Floor

1. Modernize teachers' rest room.
2. Create boys' toilet where principal's office is now located.
3. Change office on north wall to supply room.
4. Install girls' toilet on west side of building.

Fifth Floor and Roof

1. Remove C.R. partitions and create new gymnasium.
2. Install new boys' toilet and girls' toilet.
3. Remove skylights on south building roof and build up openings. Same for passage roof between buildings.

General

1. Install asphalt tile in all classrooms, corridors, and playroom on first floor.
2. Repair sash and replace window frames where required.
3. Provide drinking facilities on all floors.
4. Provide janitor's sink closet on all floors of north building.
5. Modernize all classrooms:
   (a) Replace defective blackboards at front of rooms or resurface if in good condition.
   (b) Replace slate in existing wardrobe with cork board.
   (c) Provide pupil cubicles, display cabinet, clay bin, bookshelves, magazine rack, and work counter and/or material cabinet.
   (d) Install new lighting (consider fluorescent).
   (e) Provide convenience outlet in each room.
   (f) Provide movable furniture, omit work table if space does not permit.
   (g) Provide glass vision panel in doors; repair hardware.
6. Provide intercommunication system from principal's office to assistant principal's office, custodian's office, boiler room, library, nurse's office, and one (1) classroom on each floor.
7. Provide combined sound system and program system.
8. Repair existing boilers.
9. Repairs to temperature regulating system.
10. Provide cork display boards in corridors, two (2) on each floor.
11. Provide storerooms on each floor.
12. Repaint and repair all fencing on exterior.
13. Repair all cement work on exterior where necessary; repair all entrance steps where necessary.
14. Repaint entire building, both interior and exterior.
15. Replace iron water piping with suitable brass piping.
16. Repair roof where necessary.
17. Repair all marble work where needed.
18. Repair or replace all electrical items that are required.
19. Provide water facilities in corridors on all floors for classroom use.
20. Paint swimming pool and all equipment as necessary.
21. Repair or replace all return lines on traps to water heaters, swimming pool, new and old building.
22. Modernize existing toilets; provide missing fixtures.
23. Remove skylights.

safety and sanitation. However, this criterion expressed in such general terms is not particularly helpful to the school administrator in finding a sound basis for priorities. Not all matters affecting security and safety demand the highest priority in evaluating various course of action. Some matters of safety have higher priorities than others. Seriously hazardous conditions throughout the school system have to be identified in the course of evaluating the existing plant, supplemented by periodic inspections. These will be placed in the first category. Other items involving safety may be placed in one of the next three categories, depending upon the certainty or probability of their affecting the safety of those using the facility.

Matters of health and sanitation are not easy to translate into priorities which will be accepted by a school board or a community generally. Where public health officials cooperate with the school administration, it probably is possible to describe certain extreme conditions which pose a major threat to health, particularly from the point of view of sanitation. These should be given highest priority. Conditions which over a long period of time may have adverse effect upon health, such as lighting, ventilation, and temperature control, involve a number of variables affecting priorities. Where pupils are exposed to them most of the school day during most of their school careers, such items may be assigned a relatively high priority. However, where pupils spend only part of a day under such conditions or where any one group of pupils spends a relatively small part of its school career under the conditions, it is not possible to make a strong case for the highest priorities.

Educational Balance. *Ideally* a *school system should provide equal* educational opportunities for all students. At best it is possible only to strive toward this ideal. This implies that in establishing priorities the needs of all age groups, neighborhoods, and other groupings recognized within a school system should be weighed. The prevailing tendency is to provide new and complete facilities for new and growing sections and to postpone the modernization and replacement of plant in the older sections of a community. Another common practice is to provide elaborate facilities in high schools and to neglect the facilities for pupils in the elementary schools. Complete and documental evidence of the deficiencies of the entire plant would make it possible to attain a more defensible balance, with actual construction of certain parts postponed until the highest-priority needs have been met elsewhere in the school system.

Another problem in attaining balance in the educational aspects of facilities is that of weighing the facilities for one objective against those for other objectives. By their very nature the facilities for the objectives of physical education, homemaking, vocational preparation, and worthy

3. Where existing plant lacks facilities which normally would be included in new facilities, these facilities for the existing plant have as high a priority as in new buildings.

4. Correction of unsanitary and unsafe conditions in existing facilities may have a higher priority than extensive provisions for indoor physical education in new facilities.

5. If elementary school facilities have high priority or substandard features and lack essential spaces, it may be necessary to defer some of the costly features generally found in modern high school facilities.

6. The fact that existing standards call for so much space in secondary school facilities does not mean that all such provisions have a higher priority than at least a minimum amount of satisfactory space for younger children.

7. In establishing priorities for projects it is a serious mistake to defer doing anything about the oldest and most obsolete buildings in the older sections of the area. At the very least the rehabilitation and modernization of such facilities has a very high priority. If this is not practical, replacement projects have as high a priority, if not higher, than a complete facility immediately for new areas.

8. Unsatisfactory environmental conditions in existing sites and structures may mean that relocation of the facility has a very high priority in the program.

9. Area pressures are a real consideration in establishing the order of projects, but it is often possible to make a strong pressure group accept another higher-priority project as a condition of imposing their demands upon the program.

10. Site problems frequently are used to rationalize inaction on some of the projects of highest priority, but sound programming would call for anticipation of the site problems sufficiently in advance and finding a solution to them.

The material presented in Chapter 1 should provide a starting point for developing sound priorities for projects in the long-range program of a particular community. What should be developed is a set of criteria which make it possible to classify every project and every major facility within a particular project into four categories:

1. Items which should be provided immediately
2. Items which should be provided as soon as possible
3. Items which should be incorporated into the plans for categories 1 and 2, but which will be constructed at some future time
4. Items which should be postponed until all items falling in categories 1 through 3 have been provided

Safety and Sanitation. It is probable that most American communities will place a high priority on the protection of security and health—

ABILITY TO ADVANCE A PROJECT

It is not always possible to advance the highest-priority projects at any given time. A suitable site may not be available. It may take a long time to obtain title to a site or to clear it. It may not be possible to secure the approvals required from some other unit of government—a state agency or some other local governing body. Public opinion may not be developed to a point where a favorable vote on a required referendum can be expected. The locality may not have the borrowing or taxing power to raise the money. The local tax burden for schools and other governmental functions may be too high to permit further major increases.

The school administrator should investigate all factors affecting ability to advance a particular project before recommending it for immediate action. He should weigh all pertinent legal, public relations, fiscal, technical, and practical factors affecting ability to proceed with the project at the time. Part Three will provide background for this purpose.

The most defensible procedure is to anticipate these factors at the time that the long-range program is formulated and to begin immediately to clear the way for the highest-priority undertakings. Since possession of a suitable site is so vital to advancing a project, site selection and acquisition often have to be settled first.

Where it is not possible to advance the highest-priority projects, the school administrator must consider carefully two possible courses of action. Should he concentrate upon overcoming the factors which make it impossible to proceed? Should he proceed with projects which are not so high on the priority list but which can be advanced at the time?

There is never any excuse for not doing everything possible to speed the advancement of the highest-priority projects. The school superintendent should proceed in his efforts to acquire a site. He should accumulate reserves, if legal and necessary, to overcome tax and debt limits. He should continue fiscal planning and action. He should take action to overcome legal obstacles. He should work constantly at building a favorable public opinion and attaining required approvals by other agencies.

It may not always be justifiable to hold up projects with fairly high priority because of inability to proceed on higher-priority items. In such cases it is desirable that work on the latter not detract from the activities discussed in the preceding paragraph. It is desirable that undertaking the lower-priority projects will not delay or impede ability to proceed with the higher-priority ones.

A good procedure to follow is to outline the steps which must be taken before the highest-priority projects can be started and to indicate what

use of leisure time (art, music, etc.) are relatively expensive. Such facilities often are provided before extreme inadequacies in facilities for the objectives of mastery of essential skills, citizenship, character development, and development of individual interests, talents, and abilities are corrected. The development of priorities which will lead to balance in educational facilities depends to a considerable degree upon the development of community educational standards and the securing of general agreement on the relative importance of various educational needs.

Most important of all in establishing the relative priority of needs for educational facilities is the quality of the educational process itself. The superintendent must know how the provision of a given project will affect his current budget. He should ask: What increases in the current operating budget can be anticipated when the facility is opened for use? What will be the effect of financing the project upon local tax support for current operations? Does the community have the resources to maintain and improve the quality of its educational offerings and to provide the facility?

Flexibility and Adaptability. The school administrator himself has to be able to see the long-range priorities if he is going to lead others into making wise decisions. If he places immediate administrative convenience above considerations of all possible contingencies and all possible future uses of given facilities, the superintendent himself has established a priority which may operate against education in the future. If he accepts the recommendation of subject specialists in various fields without considering the implications of their proposals for future utilization of the facilities for other purposes or for changed concepts in the same field, he may promote unwise planning. About the only certain factor in developing priorities of need is the probability of change in educational theory, practice, and emphasis. This implies that facilities which are expansible, flexible, adaptable, and suitable for multiple use generally have a higher priority than highly specialized educational facilities. Examples of solutions which meet this test have been discussed in the preceding chapters.

A study of the community will reveal trends, plans of other community institutions or agencies, and possible developments which affect priorities of need. In many cases certain projects in the long-range program should not be advanced beyond plans for their provision—another aspect of expansibility and flexibility. Their actual provision should be postponed until all pertinent facts are clear. Among the elements calling for tentativeness in certain projects are projected changes in streets or highways, zoning, residential construction, private and parochial schools, and parks and playgrounds.

DEFINING SCOPE OF A PROJECT

The "general scope" of a project must be known in order to select an appropriate site, to secure the necessary authorizations, to prepare educational specifications, to plan the budget, to select the right type of architect, and to secure the approvals essential for advancing it. The definition of the project at this point does not have to be as specific as it must be before work begins on preliminary drawings. This latter stage will be covered in Chapter 17.

Before deciding upon the general scope of a project to be recommended for immediate action, it is necessary to review again the basis of need, to ascertain whether any new developments or trends would alter this basis or change the solution proposed in the long-range program. Shifts in population, growth in enrollment, the erection of a parochial or private school, changes in the educational program, the completion of other facilities, and many other factors may alter the type of solution which might be suggested at any given time. It may even be necessary to change the location from that originally proposed. All possible solutions again should be evaluated.

There are two aspects which enter into the general scope of any project—location and capacity. Both are interrelated and depend to a considerable extent upon community factors affecting the future of an area. In the long-range program various possible locations may be suggested, but at this point the location is to be decided upon. After site location has been determined, three answers must be obtained relative to capacity: probable immediate capacity for which facilities must be built or rebuilt, probable later capacity that can be achieved by expansions of the facility, and possible long-range capacity which the facility might have to accommodate. Without answers to these questions the necessary expansibility cannot be taken into consideration in the detailed planning of the structure.

Another contingency to be considered at this time is that of possible errors in enrollment estimates or possible long-range decreases in enrollment. The possible ways that any excess capacity might be used in the future should be visualized in determining the general scope of the project. The resourcefulness and imagination demonstrated in this step will determine to a considerable degree the adaptability which can be incorporated into the plans for the project later.

The general scope of the project should include an itemized list of the facilities (classrooms, special-purpose rooms, and the like) to be provided in the project. This listing need not be as specific as that which will be prepared subsequently for the architect (see Chapters 12 and 17)

each step involves by way of staff activity, budget, specialist help, time, resources, and similar matters. Then a similar outline should be prepared for the project or projects which can be advanced. By comparing the two at critical points, such as staff activity and finance, it may be possible to select the proper course to take at a given time.

Other Considerations. Even where there appear to be no major legal, fiscal, technical, or other obstacles to proposing action on one or more highest-priority facilities, there are a number of practical matters to be considered. A particular school board has unique ways of reacting to problems or recommendations for action. There are community problems and pressures to be taken into account which will not be the same in different communities, or the same in a particular community at different times.

The competent school administrator will know the character of his school board and what must be done to prepare it for his recommendations. This problem is one of human relationships and administrative leadership which is beyond the scope of this treatment. However, the community studies outlined in Chapter 5 are very important in discovering the community factors with which the administrator must concern himself in proposing a given course of action.

The school administrator who recommends the highest-priority projects for advancement without having a basis for assessing community reactions and without preparing his community for the step to be taken is unrealistic at least. Such matters as racial tensions, social barriers, the power structure of the community, the attitude of the press, the strength of groups which might support the proposal relative to that of those who might oppose it, the economic interests of particular individuals and groups, and similar elements are real considerations in proposing a given school improvement in a particular location.

The reality of community sociology and economics does not imply that school administration should gear its recommendations to what the dominant forces want at a particular time. However, unless before making his recommendation he has considered these forces and factors and has neutralized sources of opposition and has enlisted the active support of those who might support his position, the administrator easily could be reducing his chances of getting prompt action on essential projects.

The type of community participation discussed in Chapter 2 is one of the best ways to build public support for sound solutions to school-building problems. It should be utilized to the fullest in planning the long-range program and in deliberating upon the problems of priorities and immediate courses of action.

to accommodate maximum periods of enrollment. A separate study may be made of underutilized buildings in the area. The scope of new construction is considerably affected by this staff study.

Fiscal capacity of the community. To recommend advancement of a project intelligently, financial planning is essential. A series of fiscal studies should be made: (1) estimation of available state assistance; (2) borrowing power of the district as indicated by valuations, indebtedness and debt retirement, tax rates for schools and other municipal government; (3) improvement of debt leeway; (4) possible economies; (5) cost estimates for various proposals, and a projection of both the current expense and the capital budgets; and (6) other data essential for a bond election where required. The data from these fiscal studies make possible the fiscal planning with particular reference to the timing of capital expenditure and borrowing. Chapters 14 and 15 provide background for such studies.

Statement of educational specifications. This synthesis of preliminary studies is the statement of approved policy and information given the architect. The desired facilities, the size, type, location, and other characteristics of each, the functions to be housed, the relationship of spaces, the performance standards—these and other facts and factors need to be brought together as a separate study. The statement of *educational specifications* differs from the general scope in that it relates to a specific building project to be designed and constructed. The architect should be familiar with the long-range program and the general scope of the project, but for a particular project he needs to know the educational components, functional relationships, standards, and cultural setting of the expected unit. This step will be analyzed in detail in Chapter 12.

PREPARATION FOR PROJECT ADVANCEMENT

After the general scope of the project has been approved and the site selected and acquired, the school administrator has to prepare himself for the various aspects of project administration. Many of these will be carried on simultaneously, while others have to be completed before the next steps can be taken. The studies and staff activity initiated to determine the general scope of the project will be continued to develop the detailed educational specifications for the project required for architectural planning. This represents the primary responsibility of school administration in project development.

In order to prepare himself for the other important responsibilities the school administrator may use a check list similar to the one reproduced below. His list should be based upon the laws under which he operates, established local policies, and other local variables. Such a list will enable

but it should be complete enough to provide a rough estimate of the probable cost and probable site requirements. As in the case of capacity the listing should be in three parts: spaces to be provided immediately, spaces to be added or expanded at some later date, and possible additions or changes which might have to be made in the future depending upon enrollment changes and other developments.

The statement of the spaces to be included within the general scope of the project will require advance study and planning. The thoroughness with which this is executed will facilitate later detailed planning for submission to the architect.

Staff Studies. Following is a suggestive schedule of studies that the school staff could conduct as background for the general scope of a project.

Functional analysis of educational services and departmental needs in terms of space requirements. This will be a special application and extension of the studies summarized in Chapters 5 and 6. What are the unmet educational needs of the area to be served by the new building project? What changes in the departmental offerings will develop in the foreseeable future? What spaces will facilitate the teaching and learning activities considered to be best practice? What trends are evident in the public expectancy? Considerable planning will be required to formulate the questions and to decide where to find the factual evidence. A number of contributory staff studies may have to be made, especially studies of departmental needs including enrollments and offerings. The facts thus established will be working material later for the architect and suggestive of functional concepts.

Estimation of school enrollments for the next ten years. Initially a study must be made of the general area in which the school is to be located and the probability of attendance-area changes. Chapter 9 summarizes the pertinent material in conducting such studies.

Study of school-site locations. A map-making procedure is recommended for evaluating the significant facts. The facts relating to existing plant and neighborhood trends must be drawn from the studies outlined in preceding chapters and in Chapter 11.

Appraisal, rehabilitation, modernization, and durability of existing plant. On the basis of data gathered in the studies described in Chapter 7, a statement of requirements for the project may be prepared and appropriate solutions proposed.

Inventory of capacity and potential utilization. A realistic inventory of capacity of existing facilities can be made on the basis of data provided by the studies discussed in Chapter 8. Every avenue of improving utilization of available facilities should be explored, and the future as well as present function of the buildings considered. Steps should be taken

Relationships with architects (Chapters 17 through 19)

1. Services of architect (contractual)
2. Statement of educational specifications for architect
3. Criteria for judging preliminary plans (design and outline specifications)
4. Recommendation of preliminary plans for approval
5. Procedures for bidding and letting contracts
6. Adoption of final plans and specifications
7. Supervision of construction
8. Procedures for handling change orders, payments, and program reports
9. Selection of furniture and equipment

Construction (Chapters 18 and 19)

1. Procedure for advertising and securing bids
2. Methods of handling and selecting low bids
3. Criteria for selecting contractors and acceptance of bids
4. Performance bonds
5. Approval of contract documents and their execution
6. Procedures for approving payments
7. Preparation for start of construction
8. Time schedule for construction
9. Project records and reports of progress (when)
10. Supervision of construction by owner (provision for)

Acceptance and occupancy (Chapter 20)

1. Plans for delivery of furniture and equipment
2. Inspection of construction (periodic)
3. Conditions to be met before final acceptance
4. Final inspection
5. Final acceptance
6. Final payment
7. Preparation for occupancy
8. Occupancy

SUMMARY

The primary purpose of the technical studies involving school-building standards, evaluation of existing plant, capacity, utilization, and enrollment estimation is to provide a sound factual basis for long-range-program planning. The planning aims to meet all of the agreed-upon long-range needs either through adapting the existing plant or through new facilities. Such planning requires time, facts, and creativeness.

This chapter summarized the reports which the superintendent should have prepared for consideration by the school board and other participants in the process. It developed eleven principles for sound long-range planning: conservation of values, enhancement of values, maximum utilization, temporary

him to visualize the task as a whole and to prepare in advance for the sequence of events with which he will have to deal.

CHECK LIST FOR PROJECT ADMINISTRATION

Preliminary steps (Chapters 10 through 12)

1. List of specialized personnel to be employed
2. Authorization to employ special staff as needed (legal, architectural, engineering, consultants, public relations, etc.)
3. Appropriation for project staff
4. Chart of administrative relationships with various participants
5. Selection and recommendation of staff for appointment
6. General scope of project
7. Site for project

Legal matters (Chapter 13)

1. Public notices and authorizations
2. Taxing and borrowing powers
3. Elections or referenda
4. State or local building-code approvals
5. Other laws to be complied with (bids, public utilities)
6. Contracts with specialized personnel and various contractors
7. Bond attorney and bond issues
8. Protection for school system—bonds and insurance

Budget and fiscal problems (Chapters 14 and 15)

1. Cost estimates for the project
2. Budget making and approval (fiscal planning)
3. Administration of the budget (authorizations, accounts, reports)
4. Choice of methods of finance
5. Economy in finance
6. Credit rating
7. Prospectus for bond issue
8. Marketing bonds

Public relations and relationship with other governmental units (Chapter 16)

1. Preparation for public discussion and interpretation
2. Potential sources of opposition and plans for countering these
3. Major groups to be reached and plans for enlisting their support
4. Preparation for elections or referenda
5. List of other governmental agencies or units which will be involved and in what way
6. Procedures and plans for dealing with these
7. Program of reporting and publicity
8. Special events (dedication, etc.)

RELATED READINGS

American Association of School Administrators: *American School Buildings*, Twenty-seventh Yearbook, Washington, 1949.

Anderson, Vivienne, and Daniel R. Davies: *Patterns of Educational Leadership*, Prentice-Hall, Inc., Englewood Cliffs, N.J., 1956.

Castaldi, Basil: *The Road to Better Schools*, New England School Development Council, Cambridge, Mass., 1955.

Dice, N. R.: "Role of the Superintendent in Obtaining Effective Staff Coordination and Cooperation in Schoolhouse Planning," *Proceedings*, Association of School Business Officials, Kalamazoo, Mich., 1954, pp. 195–197.

Engelhardt, N. L., and Fred Engelhardt: *Public School Business Administration*, Bureau of Publications, Teachers College, Columbia University, New York, 1927.

Gaffney, M. W.: "Abandon or Rebuild," *American School Board Journal*, 128:53–56, February, 1954.

Herrick, John H., Ralph D. McLeary, Wilfred F. Clapp, and Walter F. Bogner: *From School Program to School Plant*, Henry Holt and Company, Inc., New York, 1956.

Milwaukee Board of School Directors: *A Five-year School Building and Future Sites Program, 1956–1960*, Milwaukee, 1956.

New York State Education Department: *Room to Learn: A Guide for Community Participation in Planning for School Building Needs*, Albany, N.Y., 1949.

Pierce, Truman M.: *Controllable Community Characteristics Related to the Quality of Education*, Metropolitan School Study Council, Research Studies No. 1, Bureau of Publications, Teachers College, Columbia University, New York, 1949.

Reeder, Ward G.: *School Boards and Superintendents*, The Macmillan Company, New York, 1954.

Wahlquist, John T., and others: *The Administration of Public Education*, The Ronald Press Company, New York, 1952.

versus long-range solutions, probability of error in enrollment estimates, probability of change in program, general versus specific plans, tentativeness, thoroughness, community development, and completeness. Proper documentation of the recommended program is important.

Generally the total building program will have to be administered in successive steps which call for decision on priorities. The problem is to be fair to the needs of all parts of the educational program while achieving such marked improvement of particular facilities as has normally prompted the plans for new construction.

The achievement of the program through completing the highest-priority projects in sequence requires an acceptable basis for establishing priorities. Guiding principles for establishing priorities were presented. Where it is not possible to advance the project with highest priority, two courses of action have to be considered. Guidance for choosing the right one is provided.

In order to take the next steps in advancing a high-priority project, such as selecting a proper site or preparing educational specifications, it is necessary to prepare the general scope of the project. It is important at this stage to review the steps involved in advancing the project to occupancy and to prepare for each successive step.

DISCUSSION PROBLEMS

1. Which parts of a long-range master plan for school-plant improvement would have to be reevaluated each time a new building is planned as part of the program?

2. How can the characteristics of present school-plant design that will be generally accepted in the future be recognized by forward-looking school authorities and incorporated in the plans?

3. How may systematic records and reports of staff work be prepared and organized?

4. How may staff planning be coordinated to obtain maximum group thinking for the over-all scope of a project, rather than along lines limited to individual interests? How can the teacher so channel his aims and experiences as to be understood by the school-plant planning specialist?

5. Prepare the outline of a school-building-program control record that will keep the school board informed as to progress of the program and necessary legal decisions.

6. Prepare a layout for a public relations brochure to be distributed in advance of a school-bond election. Should outstanding needs or future advantages be given foremost emphasis?

7. What measures may be taken to strengthen the financial ability that can be made available for the support of high-priority projects?

8. Compare the operation of a citizens' advisory committee with having the school board deal directly with the community as a whole with respect to the priority of items in the long-range school-improvement program.

the purpose of the school changed so that the existing site is too small for additional construction. The remedy then is either to acquire adjacent land or to develop a longer-range plan based on selection of a different site.

Seemingly the only answer for older city sections, other than the half-way measures commonly practiced, would seem to be, as Holy has advocated,[1] a bold and imaginative city planning that handles modern traffic, local industry, and city parks and parkways and school sites in one broad scope. Where land areas are more spacious and residential construction more fluid, as in the newly developing sections, there should be little excuse for repeating mistakes of the past. The U.S. Office of Education's Biennial Survey of Education in the United States shows that the total reported value of school property today is almost twenty times more than it was in 1900. With this tremendous public responsibility it has become a clear duty of school administrators to use scientific, objective measures in the selection of their future school sites.

Nowadays the problem of traffic flow compels a restudy of school-site location. Whereas the problem of site location when children are transported is one of utilizing highways, the problem of elementary school-site location within built-up cities seems to be one of avoiding hazardous highway crossings. In this respect new housing developments appear to have an advantage because of more modern highway planning. In the suburbs of cities, where many children reside, the highways center in the city itself. Several states are approaching this latter problem by enabling large city school districts to expand free of political boundary entanglements and to merge suburban schools into their service area.

If the size and organization of the school were of no concern, doubtless an idealistic grid pattern for elementary school sites could be worked out in many cities. Sites could even be stock-piled in advance according to the pattern. This scheme seldom works successfully; the growth of city sections is not that predictable. New York City has taken a different approach in its analysis of overcrowded schools; the relationships of schools and neighborhoods adjacent to an overcrowded school are studied as a cluster, and the best solution is sought to relieve the complex problems of each cluster.

But in the sprawling suburbs of some Western cities we find another solution. Here new campus-type schools are constructed of a size and organization that is based more upon educational adequacy than upon proximity to the residential dwellings. The majority of pupils travel to these schools by school-operated or public conveyances. Judging by the manifest interest in school affairs under these conditions, one may con-

[1] R. A. Holy, "Relations between City Planning and School Plant Planning," *American School Board Journal*, 118:19–20, January, 1949.

CHAPTER 11

Site Selection and Development

Planning a long-range school-building program involves reappraisal of existing school sites and planning of future school-site locations. The desirability of protecting the investment of school-construction funds with school sites that assure long-term adequacy is evident. Fairly systematic survey methods have been developed for this purpose.

In surveying school-site requirements for a community and preparing specific site recommendations with respect to a building program, there are five major problems to consider. First is adequacy of site according to established standards. This is the concept of form, size, and other characteristics that go to make up the desired program and plant; expressed as a set of standards, this concept provides the objective goal to be attained where at all possible. Second is the location of site in reference to the center of population, usually a matter of primary concern, although transportation introduces some possible elasticity in making this decision. Third is the school-organization policy of the community as envisaged in requirements formulated and accepted by the board of education. Fourth is the problem of economical acquisition of school lands. Fifth is the possibility of developing school grounds to serve broadly the educational and cultural needs of school and community.

RELATION OF SCHOOL SITES TO COMMUNITY PLANNING

Often an existing school site is unsuited for long-range use. In crowded, built-up areas the location of the site may have become obsolescent because of industrial encroachment or permanent shifts of the population. Or, as often happens, the child population may have increased and

ceptable plot, especially if the cost of remedying the defect were prohibitive.

The standards by which each factor is judged will depend upon the local educational program and the community setting. The following

Fig. 11-1. A score form is useful in comparing possible sites in the site area.

FACTOR PROFILE OF SCHOOL SITES UNDER CONSIDERATION

School ______________ Attendance Area ______________

	Site Factors	Score 0	1	2	3	4	5	Essential Data
Size and Location	1.1 Size and shape							
	1.2 Accessibility for pupils							
	1.3 Accessibility for public							
	1.4 Location on master plan							
Topography	2.1 Building elevation and orientation							
	2.2 Soil and water-table conditions; foundations							
	2.3 Contour and utilization of land							
Environment	3.1 Traffic and related safety							
	3.2 Freedom from nuisances or hazards							
	3.3 Neighborhood and cultural characteristics							
	3.4 Natural advantages							
Cost Factors	4.1 Cost of purchase and clearance							
	4.2 Cost of remedying shortages							
	4.3 Cost of plot development							
	4.4 Long-term utility							

Site	Location	Rating	
A.			
B.			
C.			
D.			

Surveyors, ______________

____

____

Date ______________

clude that good school organization with adequate facilities makes a more powerful community-centered school than does the small neighborhood building whose only claim to community centeredness may be its traditional half-mile distance from the homes. At any rate, modern habits of transportation may well introduce considerable doubt as to the universality of any rule for locating sites according to uniform standards of distance.

Efforts to locate schools on or in relation to city parks or parkways sometimes have met with disappointment. While school sites would be enhanced by a surrounding park and while school districts do make provision for recreational and cultural utilization on the part of the public, the philosophies of school districts and park departments are often different. Cooperation where possible is, of course, highly desirable. The more promising development is joint planning between municipal planning agencies and school officials. Points on which municipal agencies could be informed are the school-district policy as to optimum enrollment for building units and travel distances, the modern standards as to size of school sites, the desired safety factors, and the relationship of site to community interests. The municipal agency may not be depended on to do more than the law allows, but with the present trend toward large-scale construction of residential subdivisions some school districts have had reserved for them very satisfactory school-site acreage through cooperative action.

Consolidation of school districts in rural areas and growth of vast new residential sections in expanding industrial regions make necessary a farsighted policy for school-site acquisition to protect future investment in those sections. Such a policy would need to consider maximum economy, educational efficiency, and the implications of recent trends in residential living. The objective thus far in sparsely populated regions has been to locate the school at or near a socioeconomic center which usually is near a crossroads. This requires considerable foresight; highway and transportation improvements of the past two decades already have forced consolidation of previous rural school centralizations now outdated and found to be too small (less than 600 to 800 enrollment).

STANDARDS FOR SCHOOL-SITE EVALUATION

A profile chart of the type illustrated herewith (Figure 11-1) is a convenient device for ranking school sites against objective criteria. Because of the complexity of the decisions that have to be made, surveyors often prefer a profile graph enabling them to compare relative advantages of the sites on each item without arbitrary weighting. Obviously a very low rank on only two or three items might rule out an otherwise ac-

district to improve the school neighborbood, attention must be given to the long-term environs of the school. A residential neighborhood is preferred.

3.4 *Natural advantages.* Some school sites have unusually fine vistas and esthetic qualities.

Standards for cost and utilization

4.1 *Cost of purchase and clearance.* Both purchase price and necessary demolition of any existing structures must be considered as original cost.

4.2 *Cost of remedying shortages.* Often sewage disposal, water supply, utilities, pavement, and drainage become substantial cost items.

4.3 *Cost of plot development.* Grading, walks and driveways, parking areas, playfields, and the like are important costs in site selection. (These three factors —4.1, 4.2, and 4.3—together comprise initial site expenditure.)

4.4 *Long-term utility.* Over a period of years the utilization of a site may change; the enrollment may increase, the purpose of the school may be altered. A good school site will have enough flexibility to ensure satisfactory utilization if the building is enlarged or if new out-of-door activity spaces are required. The location and usable areas of the site should be adequate for all foreseeable contingencies.

Competence of Evaluators. Not uncommonly school sites are known to be available or otherwise offered to the school board, and the board is unduly influenced by personal feelings and apparent economy. To safeguard against possible error under these circumstances, an impartial rating of potential school sites should be secured from competent authorities. Qualified specialists for this purpose include a school architect, a civil engineer, and the school administrator or educational consultant. A very good rating should be secured by using these three types of specialists as a team. Test borings will show foundation problems. Contour studies will indicate drainage conditions and necessary grading. And a careful survey will show available utilities and other environmental relationships.

Adequacy of School-site Area. There has been a surprising amount of agreement among leading educational authorities for over thirty years as to appropriate standards of size for school sites. Moehlman, Engelhardt and Engelhardt, and Strayer formulated and published in the 1920s a clear concept of utilization for school-site acreage. Since that time the older concept of a school building set at the corner of a city block, occupied on school time, and fenced and policed against vandals during other times has all but disappeared in most places. In fact, taxpayers today are talking about the economy of increasing the utilization of the school plant; and school boards are concerned to protect their investment in costly buildings with sufficient acreage (often 35 to 60 acres or more for major campus-type plants) to ensure flexible and long-

standards to accompany the Factor Profile of School Sites under Consideration are proposed as general guides.

CHECK LIST OF STANDARDS

Standards for size and location

1.1 *Size and shape.* Elementary—minimum 5 or more acres depending on size of school. Secondary—minimum 15 to 25 or more acres. Rectangular shape is desirable, but an irregularly shaped plot may be tested by scale drawings showing all major utilization.

1.2 *Accessibility for pupils.* Located within 1½ miles of pupil residence unless transportation is planned. Minimum of dangerous highway crossings. Adequate approach for school buses. Possible access to public transportation.

1.3 *Accessibility for public.* The trend is toward more public use of school facilities and greatly increased public attendance upon the informal activities of the school. The children must have a safe way to return home from school after evening activities and in all seasons of the year.

1.4 *Location as to long-range plan.* Objective measures of amount and direction of population growth in all its aspects; relationship to other parts of the district and to the educational program; disposition of existing sites and buildings; and plans for future site acquisition—the factors of the school district's master plan will affect any particular site determination.

Standards for topography

2.1 *Building elevation and orientation.* The site should afford a commanding location for the building. Each part of the building should have correct orientation as to natural ventilation, fenestration, etc.

2.2 *Soil and water-table conditions; foundations.* Such assets as drainage, good surface soil, and possibility of economical excavation and foundation work will result in substantial savings. Test borings should be made.

2.3 *Contour and utilization of land.* The contours and distribution of natural elements, such as soil, rocks, water, and sand, require careful study in view of the expected utilization. A survey map should be used to plot the athletics fields, parking spaces, and building site and its proposed extensions. Interesting contour is not objectionable unless it will require excessive costs for grading the necessary level spaces. However, the relationship of play areas to buildings must be reasonable.

Standards for environment

3.1 *Traffic and related safety.* The immediate environs of the school where most congestion occurs should provide safe and adequate approaches. Any unusual and nonremediable safety risk may rule out a particular site.

3.2 *Freedom from nuisances or hazards.* Generally the ideal site is remote from noise, odors, dust, industrial traffic, business distractions, and health hazards or dangerous places.

3.3 *Neighborhood and cultural characteristics.* Since it is difficult for a school

3. For *senior high schools,* it is suggested that there be provided a minimum site of 30 acres plus an additional acre for each 100 pupils of predicted ultimate maximum enrollment. Thus, a senior high school of 1000 pupils would have a site of 40 acres.

Because the site-size problem varies in accordance with the needs of the type of school organization and in terms of the age and development status of the community or school district, the foregoing rules must be taken as *minimums* for which all should strive and which most should exceed.

The New York State standards, illustrated in Figure 11-2, like those of several other states, demonstrate modern practice with respect to school land usage and afford a conservative standard as to minimum school-site size for the needs of built-up communities. In rural areas and less densely built-up cities there is ample opportunity to take a firm stand on adequacy in the size of school sites.

The city problem. When the available school sites are inadequate in size to begin with, as is true of numerous old sites in congested, built-up areas, to construct further school additions on them obviously will decrease the plot area available for out-of-door purposes while at the same time increasing the pupil load on the remaining unoccupied plot area, as has been thoroughly documented in past surveys of city school problems. Yet the problem of restricted school sites is inescapable in the built-up sections of populous cities because of the high cost of land. The carefully considered policy of larger cities usually involves some compromise on site size in difficult areas, especially those where the land is fully developed and street traffic is heavy. This is partly an economic problem for the school board, but it also is a practical recognition of the physical realities of the existing structure of the city. An interesting solution to this problem was reported by Almeda, California,[3] which adopted a one-city-block-size site as the ultimate goal. The objective then was to find suitably located blocks generously sized and thinly settled which could be cleared by demolition and made into compact, unified school plots without disturbing or overlapping existing streets.

More research needed. It must be conceded that we do not have any absolute measure of school-site needs. We depend for our judgment upon experience with school-site utilization and the relative economy of allowing for growth and flexibility. A recent editorial comment will serve to illustrate:[4]

> . . . Few if any studies show the educational benefits a community can expect from a given amount of land. Perhaps this is just as well, for the educa-

[3] C. W. Hickok, "Problem of the Restricted School Site," *American School Board Journal,* 118.51–53, May, 1949.

[4] George W. Holmes, III, "Sites Come in All Sizes. School Plant News and Views," *School Executive,* 71:8, April, 1952.

term usage. What actually has emerged is a new public sentiment for improved community living.

In the frontier days and all through the nineteenth century the majority of youth learned vicariously in field and forest, in village and apprentice shop, those practical lessons of work and play that society required. If a youth also needed the experiences of practical citizenship and adjustment to modern industrial society, such need was not very apparent except for the slim minority who attended the academy and college to enter the professions of that day. Many of the inadequate school sites with which we work today are vestiges of that era—a building site obtained by the city ward boss for his constituency or perhaps a parcel granted the school district by a public-spirited landowner for erecting a schoolhouse.

Recent generations of children, however, have been reared in the atmosphere of modern technology. Those not actually playing and growing amidst the paved streets and stimulation of city life are not far removed from it. They enjoy the benefits of health standards and of the American crossroads of culture. There is no particular need to fear their ability to share responsibility for future citizenship as did their predecessors. But the implication as to adequacy of school sites is quite clear. The time is passing in most localities when boards of education have difficulty in justifying adequate size of school sites to the general public. Instead the population of new neighborhoods and new housing developments is demanding more and more in the way of intelligent land usage in the sections where they decide to buy their homes or rent apartments for their families.

Minimum space standards. The National Council on Schoolhouse Construction reports on the subject of *minimum size* of school site: [2]

> The size of any school site should be determined largely by the nature and scope of the contemplated educational program. Actual layouts of the spaces needed by the various phases of the program should be made. While it is recognized that for many schools much larger areas are preferred, the acceptance of the following suggestions will be an improvement for many of the schools throughout the country:
>
> 1. For *elementary schools*, it is suggested that there be provided a minimum site of 5 acres plus an additional acre for each 100 pupils of predicted ultimate maximum enrollment. Thus, an elementary school of 200 pupils would have a site of 7 acres.
>
> 2. For *junior high schools*, it is suggested that there be provided a minimum site of 20 acres plus an additional acre for each 100 pupils of predicted ultimate maximum enrollment. Thus, a junior high school of 500 pupils would have a site of 25 acres.

[2] *Guide for Planning School Plants*, National Council on Schoolhouse Construction, Peabody College, Nashville, Tenn., 1958, pp. 22–23.

tional value of land lies in use, not in amount. Each community has the responsibility for determining what educational values are to be derived from its school site and to acquire land accordingly. While a great many people believe that almost all schools should have large sites and that those sites should be used in the program of education, few contend that there is virtue in size alone. The trend toward larger sites is good only to the extent that it promotes the growth and development of better programs of education.

The architect and educational specialist may discover unusual advantageous features in certain of the school sites under consideration. On the other hand, if any nuisances, hazards, or inconveniences exist to so marked a degree that they cannot be overcome economically, the school board will in all probability find a costly and unsatisfactory situation on its hands.

CHECK LIST OF SPECIAL ITEMS TO BE OBSERVED

Advantageous features

1. Opportunities for orienting the buildings so as to secure optimum natural ventilation and most favorable fenestration
2. Abundant top soil for landscaping and for developing the various activity areas
3. Arrangement of level spaces for most efficient relationships of buildings and in- and outdoor activities
4. Setting conducive to favorable student and public attitudes toward use of school plant
5. Ease of operation and maintenance
6. Commanding vistas for esthetic values in design
7. Possibilities for alternative utilization as the future school population changes

Disadvantageous features

1. Soil, rock, or water-table conditions adverse to foundation work as revealed by test borings
2. Topography difficult for building sites and for arrangement of level activity areas, as shown by survey or contour maps
3. Traffic or other safety hazards interfering with pupil travel to and from school
4. Inaccessibility for vehicle traffic or inconvenience for public access by school patrons
5. Natural and industrial nuisances, such as excessive wind, humidity, dust, noise, odors, business traffic
6. Poor elevations resulting in unsatisfactory drainage
7. Lack of such improvements as roads, sewers, water extensions, sidewalks, and of such utilities as electric light and power, gas, and telephone, causing unnecessary expense

8. Existence of unusual hazards in the neighborhood, such as water, cliffs, railroads, traffic arteries
9. Unfavorable social influences in neighborhood

EDUCATIONAL POLICY AND SITE REQUIREMENTS

Whether tacit or expressed, the board of education will hold certain views that can influence the selection of school sites as strongly as any evidence introduced by an objective survey. These opinions, in which the school board and its staff participate, embrace the vision of the future educational program.

1. What shall be the type of school organization? The organization can be 6–6, 6–3–3, 8–4, 6–4–4, 12-grade comprehensive, twelve-month program. These decisions will affect location and utilization of site. Perhaps it is planned that after a maximum of elementary school enrollment has passed, the school plant will need to accommodate more children of adolescent age.

2. What shall be the size of schools? Elementary enrollments of less than about three hundred and high school enrollments of less than about eight hundred are measurably less efficient and less economical as determined by Mort[5] because of small-school cost factors. Furthermore, if strong specialized vocational training is desired, the larger the high school, the more specialized training departments it could afford.

3. What is the planned scope of school offerings? The community may wish to utilize the school plant for cultural activities and for adult education. If the school board is to assume responsibility for public recreation, it would be well for them to have supervision of the community program at least as far as school lands are concerned. The future expansion of program for kindergarten, for new types of youth activity, for after-school use, for postgraduate or postsecondary school training, and similar possibilities should all at least be considered when a new site is chosen. Experience has shown that it will be difficult and expensive to purchase additional land for expansion after a neighborhood is built up.

4. Shall the elementary schools be neighborhood units or part of a campus-type development? There seem to be advantages both ways. Supervision and programming are apt to be more effective in a flexible, varied campus development. The small neighborhood units exemplify public confidence in the common school as a center of neighborhood culture and possibly provide more intimate home-school relationships for kindergarten-primary children.

5. Will the school land be used as an out-of-door laboratory? New

[5] Paul R. Mort, *The Crisis in Central School Finance*, New York State School Boards Association, Albany, N.Y., 1947.

practices are emerging in the applications of out-of-door classroom activity. The possibilities range from agricultural experimentation to school camping. The latter is an expanding movement. On this subject the National Council on Schoolhouse Construction states: [6]

At least two types of school camps might be considered: (1) nearby camps for day trips and (2) camps remote from heavy traffic and city influences where children and youth can live with camp counselors for periods of two weeks or longer. For the first type of camp site 20 to 40 acres should be adequate. The second type of camp site should have a minimum of 100 acres, and a much greater area will be needed for the larger camps as the camping programs develop.

The camp site should include a large wooded area, some hills if possible, nature trails, some land suitable for gardening, an area which can be prepared for play fields, and a lake or small stream which can be damned up to make a lake. The site should include an area which can be well drained for the necessary buildings. The site plan should be laid out similar to a village with several scattered living areas and a central group of general buildings. The general appearance should be spacious. It should look like a camp rather than an urban institution. With certain soil conditions, it will be advisable to connect the buildings by gravel paths and to provide surfaced drives from main buildings to the highway.

The controlling factor is the ability of school planners to project an educational program for out-of-door spaces. As stated by the American Association of School Administrators: [7] "The size of any school site should be determined by the nature and scope of the contemplated educational program. To accomplish this, actual layouts of the spaces should be made." The school site of the Katy Independent School District in Texas contains 100 acres which provides the land needed for raising fat stock in connection with the school's agriculture department. A school-site plan developed by DeShaw is designed for recreation, athletics, nature study, public parking, and outdoor activities of self-contained classrooms, all concisely arranged on a site of 10 acres.

PLANNING SITE LOCATIONS

The location of school sites in relation to where the child population will probably reside is, of course, a matter of judgment. School sites can become obsolescent as quickly as buildings, sometimes quicker, and therefore it is essential that selection of site locations for future buildings be done as scientifically and as objectively as possible.

[6] *Guide for Planning School Plants*, National Council on Schoolhouse Construction, Peabody College, Nashville, Tenn., 1949, p. 33.

[7] *American School Buildings*, Twenty-seventh Yearbook of the American Association of School Administrators, Washington, 1949, p. 75.

Analysis of a community may very likely show that child population is clustered sociologically, sometimes on the fringes of industrial belts in cities, sometimes in recent large-scale housing developments occupied predominately by younger families, sometimes in low-rental sections of cities. Further analysis may disclose that the strategic factors of the community are changing, the utilization of residential dwellings may alter, there could be numerous apartment vacancies, or one-family houses may be converted to multidwelling apartments or rented rooms.

Without extending a discussion of all the combinations of circumstances that can and do occur, it is evident that practical mapping techniques are necessary to get a measure of the local conditions. Some physical changes can be quite abrupt; a new superhighway might become a virtual pedestrian barrier for small children. Industrial changes may result in the isolation of some school-site locations. The ebb and flow of population densities in residential neighborhoods, the geographic and artificial features of the area, the zoning and city planning, the means of pupil travel to and from school—these and related factors must be studied and forecast, as well as the future enrollment trends.

Preparation of Maps. Caudill and Rowlett recommend the preparation of maps for not less than seven purposes: [8] to find out where the students live; to discover where the preschool children live; to learn what land is available; to check up on the zoning ordinances; to determine the boundaries which might hinder residential expansion; to study traffic patterns; and to estimate in which directions the community will grow.

The following types of maps have become fairly standardized through practice and experience. All should be included in an objective site survey.

1. Spot maps showing pupil and preschool-child residence
2. New-dwelling-unit maps
3. General housing maps showing also available land
4. Geographic maps showing natural and artificial barriers and other features, as parks, highways, waterways, railroads, industrial plants
5. City or county zoning and land-usage maps
6. Highway traffic-flow maps
7. Pupil-travel maps in relation to school sites

For the most part these maps either are readily available or can be produced with small effort and low cost. The education specialist is not particularly concerned with fundamental map-building techniques. He is possessed of [illegible] ill in map reading, and his primary concern is to add educati[illegible] th[illegible] le commercial maps and accentuate the local featu[illegible] for school-site analysis.

The first of t[illegible]. the spot map of pupil residence,

[8] William W. C[illegible] the School Site, Report no. 3, Caudill, Rowlett, [illegible] 1952[illegible]

is a type that necessarily must be constructed by the school authorities (Figure 5-2). Certain labor-saving devices are in common usage for the preparation of spot maps: have each homeroom teacher mark the residences of his class on a large-scale map supplied to him for this purpose; transpose these data with uniform symbols to the master map, using India ink for reproduction purposes; keep the symbols sharp and distinct; use overlay maps of uniform scale for (1) elementary, (2) junior high school, (3) senior high school, (4) junior college, (5) parochial or private school, and (6) preschool-age children. The use of overlay maps avoids crowding too much information on a single map. The office records of the school, and particularly the school-census records, could be used to tabulate essentially the same information as is obtained by the classroom method outlined above. For making a preschool-age spot map, a careful census or a house-to-house survey will probably be necessary.

Spot maps do not necessarily show where children will live in the future, and so other types of maps are equally important. They do disclose the relation of site to the present concentrations of child population.

The other basic maps required for a survey and the essential data for preparing them are normally obtainable in built-up areas from the city departments, the real estate interests, and the commercial map-making firms. Sometimes a utility company or a research organization will supply valuable specialized maps. The Sanborn maps used by fire insurance and real estate firms are especially valuable in densely built-up areas. In sparsely settled regions maps of this detail may not be available, but neither are they required. Maps published by the state or county department of public works, or the U.S. Geodetic Survey land-contour and improvement maps, will suffice for thinly settled areas. Aerial photographic maps for most parts of the country may be purchased from the Federal government (Commodity Stabilization Service, Coordinator of Aerial Photographic Work, U.S. Department of Agriculture, Washington). In general, satisfactory maps are obtainable from local sources for highways, land usage, zoning, U.S. Census data, traffic load, public parks, and other public properties. For study purposes the large-scale maps are advisable. But for survey reproduction and reporting some thought should be given to having a uniform scale among the several maps to be reproduced.

Often it is necessary to bring the housing maps up to date. As an emergency technique two persons can construct a satisfactory housing map of the one-family dwellings by cruising slowly (about four miles per hour) along the street or highway and recording the observed structures with symbols on a large-scale highway map.

The presence of new homes obviously suggests the need for reexamining

acceptable to parents because of the increased safety and comfort. The chief point of concern is that buses arrive at designated stops on an absolute time schedule.

Rural transportation has made possible widespread consolidation of schools in sparsely settled regions. The outside standard for rural areas is that children should not have to ride on the main bus route more than one hour per trip. A large proportion of school sites acquired in the immediate future will serve rural school-district consolidations, growing residential settlements that lie within commuting distance of metropolitan centers, and new housing projects on heretofore undeveloped land within such metropolitan areas.

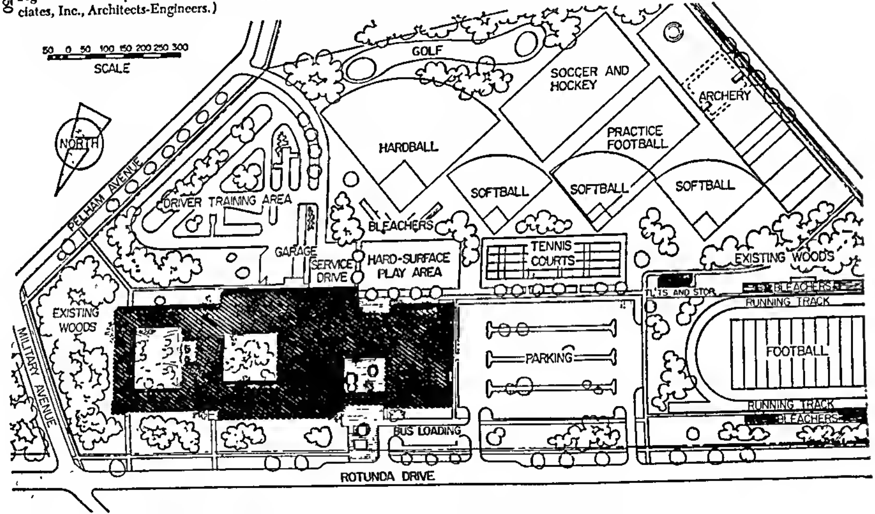
Neighborhood Planning. The use of status maps is an important technique but not a substitute for careful study of the evolution and probable future change of each school neighborhood. The development of a city residential section may follow a deliberate plan with winding streets, a community center for small trade shops, and cultural facilities including youth recreation. As a rule, business traffic and through highways are routed outside of such a planned neighborhood, leaving reasonably safe, quiet residential streets for pedestrian crossing. A neighborhood elementary school site is logically affiliated with such a self-contained neighborhood.

Site-acquisition Policy. In most instances, largely as a result of necessary secrecy of land acquisition, the boards of education have not been successful in forcing large-scale contractors by law to reserve school lands. However, much progress has been made through persuasion and citizen demand. Schools enhance the market value of residential property. The board of education should instruct the superintendent to work closely with planning commissions and other responsible agencies such as Federal-housing authorities and to submit regular reports on the subject. This is not to suggest imprudent building of schools before the children arrive. Rather it is an invitation toward cooperative planning of good schools and good school sites on the part of all government agencies and business concerns that are creating the future residential life in the community.

Procedure for Choosing New Sites. The general method of selecting new school sites is either to *designate a site area* within which a site is to be acquired or to determine several characteristics as to location that the new site should have. In some cities the school board is required by law to advertise such general site areas and invite bids from owners of available lands. This, of course, would suggest speculative bidding.

Even though the school board determines to engage expert assistance and rate the possible school sites in an impartial, objective manner for a given attendance area, they may find that some compromise decision has to be made among several sites under investigation. Engelhardt and

Fig. 11-3. Development of a 46-acre wooded site. Edsel Ford Senior High School (*Nation's Schools, March,* 1955, Eberle M. Smith Associates, Inc., Architects-Engineers.)



Linn and other school-plant specialists have published score cards with which to rate school sites. Usually the total score of major items on the weighted scale is a maximum possible score of 1,000 points so that the sites can be ranked in order of their point scores. Final decision must be based on objective school-site factors, comparative costs, and the place of a proposed site location in the long-range school-building program (Figure 11-1).

SPACE UTILIZATION OF SCHOOL GROUNDS

Many citizens will take great pride in the development of their local school grounds. A school surveyor once noted that schools surrounded by beautiful grounds seldom have broken windows. What is the value of a school? The value rests in the esteem in which it is held by the community. The grounds about a school are like the framing of a beautiful picture or setting of a jewel; they should do justice to their subject, which after all is a serious public undertaking.

Educational policy of a community is first reflected in the minimum space standards adopted for site acquisition. It is further implemented by the land-usage plan for school-plot development. In Chapter 2 the participation of citizens committees was discussed. When one considers that the time and effort expended on informal school activities today equals or exceeds that spent on the conventional formal learning activities, the place of a citizens' advisory committee in school-site planning is apparent. Wherever possible, the local city-planning commissions, because they have common interests and can supply useful assistance, should be invited to participate in the planning.

The following check list enumerates factors to consider when preparing the plan for developing a school site.

CHECK LIST FOR SCHOOL-SITE IMPROVEMENT

1. The long-range land-use plan is prepared by a landscape specialist in coordination with the architect and school staff.
2. The building location on the site provides for a quiet, pleasing atmosphere, free from traffic or other hazards.
3. The driveway layout is economical and direct, and it permits good control of traffic.
4. Service drives, delivery areas, and parking areas are segregated from recreational areas to minimize hazards.
5. Walks adequate for pedestrian traffic follow direct and natural lines in harmony with the building and normal usage. (In width, multiples of approximately two feet and enlarged walk intersections are proposed for concrete walks. However, asphalt and other hard-surface walks are acceptable where irregular paths are followed.)

6. Parking areas and bus-loading stations are designed realistically and subject to school control.

7. The comprehensive planting diagram for beautification and improved utilization of the grounds will usually include foundation plantings below window-sill height, hardy shrubs at intersections, preservation and planting of trees for shade or wind control along borders well apart from the building, and a variety of perennial flowering plants and shrubs for natural interest.

8. Adequate drainage is achieved and court areas are surfaced where necessary.

9. Expert assistance is employed for tree culture and in the selection of plantings adapted to soil, shade, moisture, and climatic conditions.

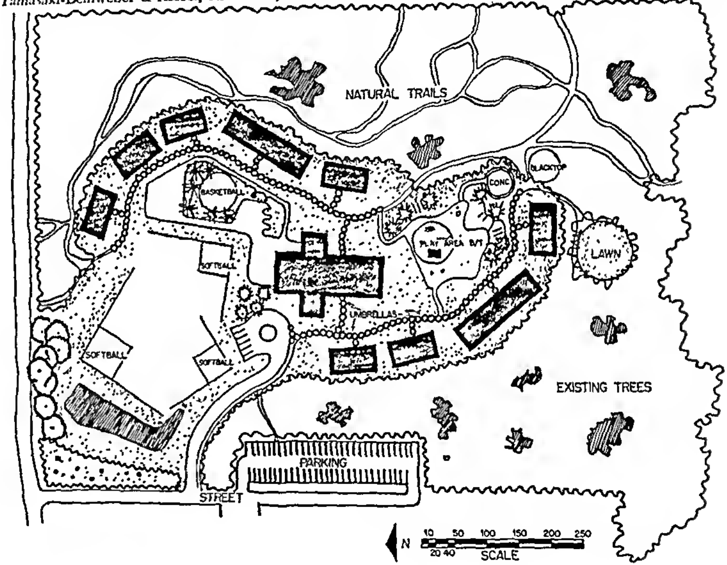
Technical Competence in Developing Integrated Plot Plan. The school architect should be encouraged from the outset to design and submit a complete plot plan for school-site utilization. Technical planning for improvement of the plot should begin immediately while the proposed new building is being designed. If a landscape expert is employed directly by the school board, or by the school architect as a part of the architectural services, he can save the district considerable expense in preserving trees and shrubs, planning walks and drainage, conserving all-important top soil for green turf, and developing the layout for ultimate beautification of the site.

The grading for driveways and playfields may be well underway at an early stage in the blueprint work. Certain it is that eventual and complete development of the total school site is apt to come long after the buildings are finished and occupied. But an intelligent, imaginative master plan of school-site improvement prepared by a capable architect, if it be only a diagram framed and hung in the main office of the school, has a way of getting accomplished—even perhaps to the community picnic grounds, the nature trail, and the public swimming pool.

There are many possibilities to explore. The National Council on Schoolhouse Construction, the Association of School Business Officials, the National Recreation Association, the National Education Association, various school development councils, and the state and Federal offices of education have responded with publications of standards and suggestions.

Trends in Planning Educational Use of School Grounds. The school grounds, of course, are to be used. The drainage and soil preparation have to be intelligently planned to support a quality of turf that will stand much usage. Under most conditions this is more a matter of correct initial planning than of any unusual expense for grounds maintenance. Generally a good mixture of humus and top soil is the secret to long-wearing turf, particularly during dry seasons. Sprinkling the playground with water is expensive and to be avoided. The roots of grass are shallow and retention of humidity for growth is dependent on establishing a few

Fig. 11-4. A school-site layout which preserves existing trees. Hemlock Avenue Elementary School, Gary. Yamasaki-Leinweber & Assoc., Architects; W. M. Ruff, Landscape Architect. (*Gary, Indiana, Schools.*)



inches of top soil mixed with a humus, such as well-rotted manure, that will retain humidity from the atmosphere. Occasional chemical feeding is also desirable. In moderate climates nitrogen can be fixed by growing leguminous plants such as clover.

Probably the foremost consideration is to have areas designed and equipped for a variety of out-of-door physical activities (Figure 11-5). In laying out such areas attention must be given to different age groups. Play areas for concentrated use during class time should be nearby, but sufficiently removed so as not to interfere with classes in the building. There should be a logical grouping of the areas according to the age of children and supervision required. Standard field and court dimensions may be secured from professional and commercial organizations. With some ingenuity an overlapping system of courts can be designed for a wide variety of activities and with multiuse adapted to popular seasonal sports.

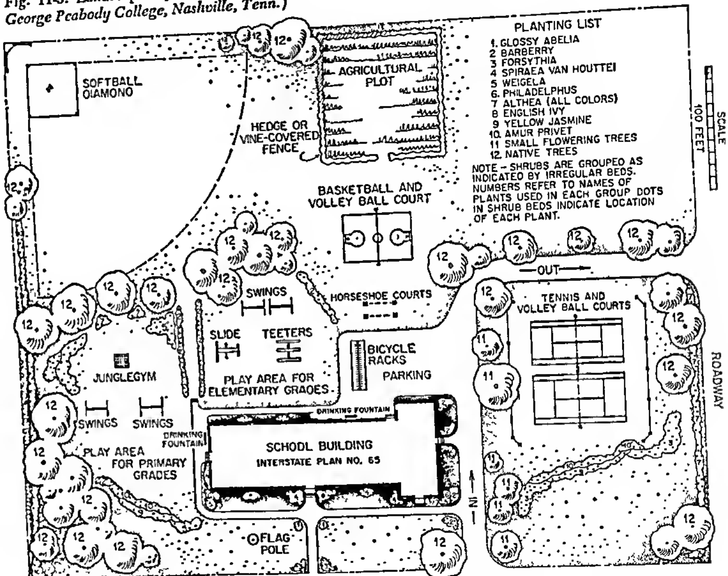
The invention of more outdoor games is something to be encouraged. Among the possible sports activities to consider in the layout of grounds are these:

Primary grades	*Intermediate grades (boys and girls separate)*	*Higher grades*	
Tree house	Play apparatus	Softball	Tennis courts
Slides	Shuffleboard	Volleyball	Horseshoes
Sand boxes	Hop-skotch courts	Badminton	Football
Climbing structure	Marble courts	Archery	Baseball
Jungle gyms	Roller skating	Field hockey	Ice skating
Circles	Unobstructed space for organized games	Handball	Skiing
Courts for wheel toys		Paddle tennis	Track
Space for informal play		Croquet	Soccer
Paved walks		Clock golf	Swimming

When an area is to be used for different sports and games at different seasons and periods of the week, provision must be made for removal and storage of goals and bases. Also, the area must be laid out so that objectionable obstructions or hazards do not interfere with the various sports. Full utilization of any play area is dependent on good drainage, which has to be a fundamental consideration in planning.

The present trend is to discover in the out-of-door environment of the modern spacious school site many learning situations beyond the popularized sports and traditional recreational concepts. This potentiality is fostered by new arrangements of single-story schools. Huntsville, Texas, has designed for its public affairs an outdoor court with raised platform adjacent to a lateral corridor of the building which may be opened to the platform so that theatricals, pageants, fiestas, musicals, and public ceremonies may comfortably and conveniently be enjoyed outdoors. The

Fig. 11-5. Landscape layout for a six-teacher community school. (*Interstate School Building Service, George Peabody College, Nashville, Tenn.*)



possibilities for rediscovering the educational and cultural advantages of conducting social activities out of doors await only the imagination of school leaders and organizers; but the trend is sufficiently clear to indicate that adequate and thoughtfully planned school sites will repay themselves many times during a period of years.

Trends in Developing Recreational Projects. The school site could properly serve also as a public park for its community. Among the park-like features to consider in a school site would be a natural wooded section, picnic grounds, band shell or out-of-door theater, swimming pool, and centers of natural interest. Sometimes the school program and the public park system appear to duplicate or conflict. The school board should be encouraged to accept land and land-development services from other governmental agencies, but in so doing the board is obligated to assume full responsibility for control of the school grounds. The question of control has to be clear to avoid conflict with municipal park authorities. At first this principle appears to impose another harsh burden on the limited budget of the school district. But the experience reported by many school authorities has been that when they provide more services for more people the amount of local financial support increases.

SUMMARY

Technical planning of the physical assets represented in the school site involves standards of adequacy, educational policy, choice of locations, and imaginative utilization. The school site is a subject of general neighborhood concern, and the trend is toward more public usage for recreational and cultural purposes.

Whenever conditions permit, the school board should purchase school sites of sufficient acreage to protect thoroughly their future investments. Since the economic value of a school site goes beyond the original purchase price, many factors will have to be evaluated looking toward eventual improvements on the site. Specialists can be retained to advise the school board on these factors.

The standards for pupil travel and site location should be carefully considered in the light of future educational policy, because the purchase of a site represents a permanent decision. While neighborhood schools still prevail in thickly populated cities, the tendency in many suburban areas is toward campus-type development. Cooperation with municipal planning authorities may be quite profitable in this respect.

The layout for school-site development should be planned by experts, even though the development may take place over a period of years. The appearance of a school has considerable effect upon public esteem. Since many communities of America today are looking toward their school plant as a center of recreation and culture, they demand of their school boards wise management in regard to community-relatedness aspects of the school properties.

DISCUSSION PROBLEMS

1. In what ways can the high cost of large school sites be offset so that the cost per pupil is not prohibitive?

2. What is the relationship of community planning to standards of adequacy as to size and location of school sites?

3. Do the taxpayers generally recover their investment in school sites through the improvement of property values?

4. What provisions concerning top soil, trees, pavement, etc., should the general contractor of a school-construction project be directed in the specifications to make?

5. How may school-site development be a factor in all-season (twelve-month) utilization of the school plant?

6. What new concepts of school-community relations have been introduced through experience with campus-type school-plant development? Show the limitations of both the older neighborhood-school concept and the policy of transporting large numbers of pupils a distance from homes to a campus-type school plant.

7. Sketch plans for complete utilization of a 25-acre high school site (generally level, rectangular plot) located in a built-up residential section of the city.

8. Where a school site is centered in a residential neighborhood, what provisions should be made for traffic control? For school traffic and for automobile parking?

9. What are the legal powers and restrictions in your state with respect to sale of school land by the district? With respect to purchase of land for school sites?

10. Look for illustrations of school buildings located on the plot with a view to later expansion.

11. What factors determine how far in advance of new construction the school board can prudently take steps to acquire land for the school site?

RELATED READINGS

American Institute of Architects: "Landscaping the School Site," *School Plant Studies*, American Architectural Foundation, Washington, 1955.

Association of School Business Officials: *Playground Surfacing*, Kalamazoo, Mich., 1940.

Bates, H. S., and A. C. Stelling: "Landscape Development of the School Site: A Score Card and Standards," *The American School and University*, 8:170–176, 1936.

Caudill, William W., and J. M. Rowlett: *Selecting the School Site*, Report no. 3, Caudill, Rowlett, Scott, and Associates, Bryan, Tex., 1953.

Coleman, William H.: "Planning Adequate School Facilities as an Integral Part of Large Scale Housing Projects," *The American School and University*, 17:35–40, 1945.

DeShaw, E. R.: "Grounds," *School Executive*, 68:84–87, January, 1949.

———: "Planning the School Grounds," *The American School and University*, 33:217–220, 1951.

Duff, W. P., Jr.: "Check-list of Items to Consider in School Site Planning," *High School Journal*, 40:66–70, November, 1956.

Engelhardt, N. L.: "Anticipatory School Site Selection and Purchase," *American School Board Journal*, 116:33–34 ff., January, 1948.

———: "What Size School Sites?" *The American School and University*, 28:65–70, 1956.

——— and Fred Engelhardt: *Planning School Building Programs*, Bureau of Publications, Teachers College, Columbia University, New York, 1930.

Gossard, A. P.: "Aids for the Scientific Study of Distances Pupils Travel," *American School Board Journal*, 112:42–44, June, 1946.

Gregg, R. T., and W. R. Flesher: "Guide to Site Selection and Development," *School Executive*, 76:77–80, September, 1956.

Grieder, Calvin: "School Plant Planning as Part of Overall Community Planning in Large Cities," *The American School and University*, 17:26–30, 1945.

Holy, R. A.: "City Planning and How Zoning Affects the Location of School Buildings," *American School Board Journal*, 120:32–33, January, 1950.

Hull, R. B.: *School Grounds, Their Planning and Planting*, Extension Bulletin no. 189, Department of Agricultural Extension, Purdue University, Lafayette, Ind., 1941.

Interstate School Building Service: *Suggestions for Landscaping Community Schools*, Peabody College, Nashville, Tenn., 1941.

Linn, H. H., et al.: *Rating Form for the Selection of School Sites*, Bureau of Publications, Teachers College, Columbia University, New York, 1956.

Marsh, B. W.: "Traffic Problems and Their Relationship to School Plant Development," *The American School and University*, 7:28–34, 1935.

Martin, Dan S.: "Integrating School and City Planning," *American School Board Journal*, 130:31–32, January, 1955.

McFadzean, J.: "Examples of Site Planning, with Emphasis on the Fifty-acre Community High School Recreation Area in Reno," *Nation's Schools*, 44:34–39, July, 1949.

"New Concept in School Building," *Construction News Monthly*, January, 1953, pp. 123–126.

New England School Development Council: *How to Choose a School Site*, Cambridge, Mass., 1947.

Nichols, J. E., and others: "Sites, Buildings, and Equipment," *Forty-Sixth Yearbook*, National Society for the Study of Education, Washington, part 2, 1947.

Noffsinger, F. R.: "Story of School Sites," *American School Board Journal*, 89:39–40, October, 1934; 89:35–36, November, 1934.

Nordrum, C. B.: "Selection and Development of the School Site," *American School Board Journal*, 134:27–28, January, 1957.

North Carolina Department of Public Instruction: *School Design*, Division of School Planning, Raleigh, N.C., 1952.

Perkins, L. B., and W. D. Cocking: *Schools*, Reinhold Publishing Corporation, New York, 1949.

Punke, H. H.: *The Courts and Public School Property*, University of Chicago Press, Chicago, 1936.

Sharp, L. B.: "What Is Outdoor Education?" *School Executive*, 71:19–22, August, 1952.

Southerland, Louis F.: "New Facilities for Huntsville High," *Nation's Schools*, 50:53, July, 1952.

Stoffer, R. J.: "Engineering Surveys for School Sites," *The American School and University*, 22:97–102, 1950.

Strayer, George D.: "Selecting the School Site," *School Executive*, 55:400, July, 1936.

CHAPTER 12

Preparation of Educational Specifications

Statements of educational objectives, descriptions of school programs, summaries of possible future uses to be made of particular facilities, and a definition of the general scope of a project all serve a useful purpose in planning. Educational needs, however, have to be finally translated or projected into detailed descriptions of particular facilities. This process is called the preparation of educational specifications. It leads to performance goals for the school architect.

RESPONSIBILITY OF THE SCHOOL ADMINISTRATOR

The type of facilities to be provided in a school-building project is the responsibility of the school authorities. There are various ways in which a school administrator can proceed in preparing educational specifications, as will be described in the following sections, but he must be the one who eventually presents these specifications to the school board for approval.

Some school administrators may think that once a good school architect is employed all their responsibilities for educational planning will immediately and satisfactorily be delegated. There is no question that early selection of an architect is pivotal and that the comprehensive services of the school architect ought to be utilized. Architectural firms may advertise to provide educational engineering services as a package—available to those smaller school systems which otherwise would find them-

selves at a loss to appraise and project their educational needs in terms of physical plant. At best such services should be regarded as a resource which the local school system may use in deciding just what kind of facility will most effectively serve its immediate and long-range needs. Most educational determinations the local school staff will want to formulate by themselves, rather than to delegate such matters to a school-building architect. Actually an arrangement of checks and balances should exist among the technical advisors.

There is natural hesitance as to what extent the educational specifications should prescribe building design. Yet the school staff have already translated educational and community objectives into instructional methodology. They are uniquely experienced in such matters as (1) group activities within a classroom, (2) presentation to the class, (3) laboratory work with individual or paired students using a variety of furniture and equipment, (4) maintaining several interest centers in the classroom and using specialized storage areas, (5) displaying materials on bulletin boards and arranging exhibits, (6) having groups at work benches and other groups at a well-lighted reading table in a book corner, (7) dramatizations, (8) workshop organization, (9) small groups of three or four students or committees engaged in conference or learning projects, (10) relating class activities to areas outside the classroom. They must indicate whether they prefer self-contained general classrooms or special departmentalized rooms.

The logical flow of staff studies is from larger considerations to detailed educational specifications. General agreement can be reached on the *purposes of the school and the age bracket of the population to* be served primarily in the buildings, but detailed study must be made of the special room facilities and instructional stations required.

WHAT IS REQUIRED BY THE ARCHITECT?

The architect is responsible for efficient design, structural forms, safety, economy, and durability. He has to adapt his ideas to the environs, the site, the available finances, and the artistic expression of community life. He has to make numerous decisions on which the school staff will need to be consulted, such as between the single-story or multistory plan, single- or double-loaded corridors, connected or separate multipurpose areas, bilateral or skylighted natural illumination, and the various kinds of mechanical systems. The architect must depend upon staff judgment in such matters as specifications for usage of the site, utilization of present buildings, public use of the facilities, provisions for air conditioning, school transportation, special furniture and equipment. The school administrator is responsible for supplying every bit of educational in-

formation available, but he should not thereby inhibit the architect in producing the most intelligent solution.

In his capacity as designer the architect enters the building program at the project level. He needs a great deal of pertinent information and may want from the superintendent a more or less specific statement of the project requirements. The many proposals as to classroom layout, new services, desired facilities, relationships of rooms, and so on that are submitted to the architect could in the aggregate amount to a most expensive and unwieldy school plan, so it is his task to condense, interrelate, and compress his plans within a workable perimeter. There will necessarily be compromise and consolidation of original proposals in order to create compactness yielding fullest utilization of space without unduly sacrificing major educational objectives. Generally a functional type of building design will prove most effective, although period styles of architecture ought not to be arbitrarily ruled out unless they clearly prohibit adequate association of spaces.

Teachers as specialists have to make a transition from general purposes and principles to itemized educational specifications for the school architect. To accomplish this, they need to cultivate, develop, and formulate their concepts. Outside help may be invited to assist in analyzing and anticipating educational methods. But in any event administrative leadership will be required to organize staff studies and make use of the professional resources available. There are a number of ways of correlating staff research and conveying professional data and plans to the designing architect which will be discussed later in this chapter. In brief, the educational profession may be considered expert on (1) the educational program, (2) the planned activities and methods, and (3) the forecast of utilization.

CHECK LIST FOR THE SCHOOL ARCHITECT

Basic information on the organization of the school

1. What are the characteristic organizational features of the school system, kindergarten, elementary units, secondary school, offices, health units, playfields, community use, and the like?
2. What is the philosophy and methodology underlying the instructional program?
3. How are pupil groups scheduled and where are special facilities required?
4. What is the plan for long-range utilization of the school plant?
5. If a survey was made, what are the recommendations?

Funds available for building

1. What is the method of financing?
2. Is the project budget a complete one, and if so, what is allowed for site, equipment, construction, fees, and other items?

3. How much leeway is permissible in cost allocations?
4. Is a public relations program expected for a bond or tax election?
5. Are funds from state, Federal, or other agencies available, and if so, will negotiation be necessary?

Description of the site

1. Has a site been selected, and if so, what is its location?
2. What are its boundaries, dimensions, contours, elevations?
3. What are the results of test borings and contour survey? Availability of utilities, as sewers, water, electricity, gas, storm sewers?
4. What structures are now erected on the site and what will be their disposition?
5. Will present buildings be added to?
6. What provisions are required for school transportation? For public parking?
7. What playfield development is anticipated, such as stadiums, floodlights, tracks, fields, courts, apparatus, dressing rooms, public shelter, field houses, swimming pools, fences, walks, primary-grade play courts?
8. What special facilities will be built on the site, such as agriculture plots, picnic areas, aviation field, freezer plant, elementary school gardens, amphitheaters?
9. What provision for expansibility ought to be considered?
10. What relation does the school site have to city parks and parkways, city planning and zoning, neighborhood development?
11. What is the architecture and topography of the school's environs?
12. Is landscape planning to be included?

Persons to be served

1. What enrollment is planned for?
2. What grades and ages of children are to be accommodated?
3. What class size is desired for various grades or subject groups?
4. Will the school be utilized all year?
5. How many children are to be accommodated for lunch?
6. What is the proposed number and organization of the staff?

School-plant facilities requested

1. What is the desired number of classrooms, laboratories, and shops for the planned program?
2. What general spaces are desired as auditoriums, gymnasiums, field houses, cafeterias, offices, libraries?
3. What type of furniture and equipment is desired?
4. What special provisions are needed for community use?
5. What special provisions are requested in the way of electrical and gas outlets, workrooms, special toilets, plumbing, etc.?
6. What provisions should be allowed for storage of various types?
7. What standards are sought as to temperature, humidity, ventilation, and illumination control?

8. What esthetic effects are sought in the various building areas?

9. Is there a preference as to number of stories, type of construction, provision of exits, etc.?

10. What is the program of activities for which the plant is to be designed?

Miscellaneous (To the above check list could be appended a number of other interesting questions.)

1. What color scheme shall be used for wall treatment?
2. Is lightweight, stacking furniture desired?
3. Should bookcases, cupboards, and other casework be built in or free standing?
4. Are toilets to be provided in connection with any classrooms?
5. Shall classrooms have running water?
6. Is spectator space to be provided?
7. Will the stage of the assembly room be completely equipped?
8. Shall provision be made for air conditioning?
9. How many rooms shall be provided for guidance counselors, curriculum coordinators, health clinics, secretaries, special teachers?
10. What student-activity rooms are needed? Offices, workrooms, informal lounges?
11. What provisions are desired for visiting teams?
12. How is the building to be zoned for after-school and vacation use?
13. What provisions are needed for business management of the school, bookkeeping office, vault, loading platforms, school-bus repairs?
14. What electrical and mechanical equipment is desired for environmental control and for special instruction?
15. What areas will be used by the staff for professional planning activities?
16. What provisions should be made for audio-visual apparatus, television, and communication?

As the New England School Development Council has stated,[1] very few architects claim to be expert in solving the educational problems as they may apply to the planning of a school building. The educational authorities must first determine their own policies and be able to present to the school architect a clear statement of their building needs. Architects will differ in the amount of specific direction they need, but generally they want a clear statement of the space requirements. This may be developed through a study of service load. The Biennial Survey of Education in the United States for 1948–1950 found, for example, that on the average in public high schools 94.9 per cent of the pupils are enrolled in English, 69.4 per cent in physical education, 67.5 per cent in mathematics, 53.8 per cent in science, 30.1 per cent in music, 26.6 per cent in industrial arts, 24.2 per cent in home economics, 14 per cent in foreign languages, 9

[1] *Conducting a School Building Program*, New England School Development Council, Cambridge, Mass., 1947, p. 4.

per cent in art, 7.8 per cent in Latin, and 6.7 per cent in agriculture. The trend of a local school system may likewise be tabulated and analyzed for each department of the school as demonstrated in Figure 12-1. Various assumptions must be made as to instructional methods in the future, as to standards for square footage of space per pupil station, as to per cent

Fig. 12-1. Trend of subject enrollments analyzed as service load for a departmentalized program.

	Department	Science					Journalism
	Subject	General Science	Biology	Physics	Chemistry	Electronics	Newspaper (noncredit)
	Grade	9	10	11-12	11-12	11-12	9-12
	Periods per week	5	5	7	7	10	2
ENROLLMENT							
Prior	19__	106	19	18	22	–	12
Prior	19__	130	25	17	29	–	38
Prior	19__	102	16	30	19	–	45
Prior	19__	121	20	22	21	–	39
Prior	19__	110	32	18	19	–	41
Estimated	19__	115	30	20	20	–	40
Estimated	19__	115	30	20	20	15	40
Estimated	19__	115	30	20	20	–	40
Estimated	19__	115	30	20	20	15	40
	Average size of classes	30	30	25	25	25	10
	Number of classes	4	1	1 & 2 lab	1 & 2 lab	1	4
	Recommended sq. ft. per pupil	35	35	35	35	35	25
	Shared facilities and related spaces	Share with J.H.S.		Combined lab-classroom			Small office

of pupil stations that can be utilized efficiently, and as to other necessary spaces related to the pupil stations. The combined information may be prepared for an architect by listing the required number of rooms and their recommended sizes and pupil-station requirements.

After the school architect has been informed as to space needs, a school-plant check list can be applied to reach agreement on the numerous

details of layout. Strayer and Engelhardt pioneered the check-list technique with their publications of standards for elementary schools, for junior high schools, and for high school buildings, published by the Bureau of Publications, Teachers College, Columbia University, New York. Their lists of detailed items are widely used. An instrument for the guidance of school boards in preparing information for the school architect was constructed by the Research Committee on Schoolhouse Planning and Construction of the Association of School Business Officials, entitled *Information School Boards Should Furnish Architects.*

Ways of Communicating with the Architect. The architect's results unquestionably will be affected by the method of presenting essential information to him. Among the more popular methods of conveying basic information to the architect are school-survey reports, statements of educational specifications, check lists, projections of the educational program, and conferences.

Experience has shown that the conference method, or rather an appropriate series of conferences, is oftentimes the most productive way of reaching an understanding with the architect. Of course, he should also be given the opportunity to conduct independent studies according to his own purposes. The conferences with the architect may be held in a workroom set aside for the purpose where sketches can be displayed and left for safekeeping. Such meetings should be businesslike and follow an outline of data prepared in advance, but there should be ample opportunity for free discussion and working out solutions at the time. The personnel attending these conferences will be widely representative of teachers, business management, board members, laymen, and the several specialists.

Besides written schedules of data, the school staff should be encouraged to make layout drawings and to submit ideas according to construction-detail outlines, such as check lists of classroom features. Interrelationship of desired spaces can be shown graphically on wall charts. Sometimes it is possible to set up experimental layouts and work with demonstration rooms and furnishings. Efficient plans grow out of insight and understanding which is gained by maximum exchange of information and ideas.

Preferably the detailed check list will be adapted especially to the type of school under consideration. The following list of items intended for general use by school executive and architect in checking plans is quoted from an Ohio State Department of Education bulletin: [2]

[2] *School Plant Construction and Rehabilitation*, State of Ohio, Department of Education, Columbus, Ohio, 1951, pp. 117–119. Also *American School Buildings*, Twenty-seventh Yearbook of the American Association of School Administrators, Washington, 1949, app. C.

CHECK LIST OF SCHOOL PLANT FEATURES

Classrooms

1. Number
2. Floor dimensions
3. Ceiling height
4. Natural lighting
5. Artificial lighting
6. Acoustics
7. Heating and ventilating
8. Wall finish and color scheme
9. Doorways—location
10. Flooring
11. Electrical outlets
12. Clock
13. Sink
14. Storage cabinets
15. Tackboard
16. Chalkboard
17. Teachers' cupboards
18. Lockers
19. Wardrobe
20. Shelving and bookcases
21. Other

Kindergarten

1. Orientation to daylight, playground
2. Same as classrooms, items 1 to 21
3. Special room for clothing
4. Storeroom
5. Special storage facilities
6. Toilet
7. Drinking fountain

Library

1. Orientation
2. Location in building
3. Same as classrooms, items 1 to 21
4. Pupil capacity
5. Number and size of reading rooms
6. Shelving and filing equipment; storage
7. Workrooms
8. Conference rooms
9. Librarian's office
10. Storage space

Music rooms

1. Location
2. Same as classrooms, items 1 to 20
3. Chorus room
4. Orchestra and band room
5. Practice rooms
6. Special storage for instruments

Laboratories—art, science, etc.

1. Orientation
2. Same as classrooms, items 1 to 20
3. Dimensions of each laboratory
4. Special wiring and electrical connections
5. Water outlets
6. Gas connections
7. Special storage facilities
8. Equipment layouts
0. Instructor's workshop
10. Multiple use

Homemaking—education rooms

1. Location
2. Same as classrooms, items 1 to 20
3. Same as laboratories, items 3 to 10
4. Food laboratory

CHECK LIST OF SCHOOL PLANT FEATURES (*Continued*)

Homemaking—education rooms (continued)

5. Dining room
6. Living room
7. Laundering facilities
8. Clothing laboratory

Shops

1. Type
2. Location
3. Same as classrooms, items 1 to 20
4. Same as laboratories, items 3 to 16
5. Finishing rooms
6. Location of power-driven machines
7. Garage doors
8. Floor drains

Physical education unit—some details for boys' gymnasium and girls' gymnasium

1. Orientation
2. Dimensions
3. Flooring
4. Lighting
5. Acoustics
6. Heating and ventilation
7. Seating capacity
8. Type of seating
9. Piano storage
10. Instructor's room
11. Drinking fountains
12. Locker-room layout
13. Locker details
14. Shower-room layout
15. Shower details
16. Toilet facilities
17. Storage for equipment
18. Team rooms

Lunchroom unit

1. Capacity
2. Dimensions of dining space
3. Dimensions of kitchen
4. Dimensions of serving space
5. Teachers' dining room
6. Multiple use of dining room
7. Lighting and electrical fixtures
8. Gas connections
9. Water outlets
10. Storage spaces
11. Acoustics
12. Flooring

Auditorium

1. General location
2. Capacity
3. Flooring
4. Slope of floor
5. Type of seating
6. Acoustics
7. Lighting
8. Heating and ventilation
9. Color scheme
10. Entrances and exits
11. Checking facilities
12. Depth of stage
13. Width of procenium arch
14. Stage lighting
15. Stage rigging
16. Projection facilities
17. Screen
18. Dressing rooms
19. Storage of scenery

Office unit

1. Location
2. Telephone—school and public
3. General storage
4. Toilets
5. Washroom
6. Wardrobes
7. Safe
8. Waiting rooms
9. Clerk's office
10. Private offices for principal
11. Assistant principals
12. Guidance
13. Electrical outlets
14. Intercommunications system
15. Program clock and system
16. Centralized sound system

Students' rooms

1. Location
2. Size
3. Kitchenette
4. Storage facilities
5. Electrical outlets

Teachers' rooms

1. Women's rest room
2. Women's toilet
3. Men's toilet
4. Teachers' workroom

Medical unit

1. Location
2. Rooms required
3. Dimension of rooms
4. Toilet and lavatory
5. Electrical outlets
6. Telephone

Toilets

1. Number
2. Location
3. Number and type of urinals must meet code requirements
4. Stools
   (*a*) Boys
   (*b*) Girls
5. Mirrors
6. Bookshelf
7. Wash bowls
8. Stalls—Dimensions
9. Floor drains
10. Flooring

Drinking fountains

1. Number
2. Height
3. Location
4. Style (angle)

Wardrobe storage

1. Lockers—dimensions
2. Lockers—location
3. Wardrobe—dimensions
4. Wardrobe—location

Windows

1. Placement in instructional rooms
2. Directional glass block
3. Clear glass
4. Double hung
5. Metal sash
6. Wood sash
7. Provision for shading and darkening

CHECK LIST OF SCHOOL PLANT FEATURES (Continued)

Heating and ventilating plant

1. Location
2. Type of heating
3. Type of ventilation
4. Fuel
5. Fireproofing
6. Doors
7. Zone heating
8. Stokers
9. Fuel storage
10. Ash removal

Custodian's facilities

1. Water and broom cupboards
2. General storage of janitorial supplies
3. General storage of furniture
4. General storage of educational supplies and books
5. Vacuum cleaning
6. Trash disposal
7. Toilet and shower

Walls and ceilings

1. Materials selected for low maintenance
2. Color schemes
3. Other details

Stairs and corridors

1. Location
2. Lead to outside
3. Width
4. Height of stair risers
5. Width of tread
0. Type of tread
7. Local and state codes
8. Corridor floors—material
9. Stair treads—material
10. Ceiling acoustics
11. Wall finish
12. Built-in lockers

Doors

1. Outside
   (*a*) Number
   (*b*) Dimensions
   (*c*) Safety devices
   (*d*) Material
2. Classrooms
   (*a*) Height
   (*b*) Width

Safety devices

1. Fire extinguishers, location of—corridors, stage, shops, laboratories, etc.
2. Fire-alarm call stations
3. Panic bars on exterior doors

DANGERS TO AVOID

In specifying the kinds of spaces wanted in a facility, a danger to be avoided is that of fixing the design or precluding imagination in finding new solutions or more adaptable facilities. The educational specifications should be regarded as performance goals. What is wanted is a facility which will lend itself to the contemplated functions or uses, but which will be flexible for different functions or uses at some future time.

The designing of functional spaces and space relationships must begin with a certain outlook. Caudill and Pena state: [3]

In order to answer these questions, let us consider how a school building differs from a hospital, a bank, a grocery store, or a filling station. The answer lies not in the external appearance of the building but in what goes on within the walls. In a hospital, sick folk are made well. In a bank, money is received and distributed. In a grocery store, food products are sold. And in a school building, children are taught. It might even be more accurate to say that in a good school building, children learn! Here, then, is the concept which underlies the modern architect's approach to school design. The good school building is child centered. The child is the yardstick by which the effectiveness of the building and its equipment is gauged.

As Perkins and Cocking view the functional nature of the modern school: [4]

The design for best use of materials and best physical conditions is not enough. Far from it. Things are going to happen in this classroom. Shall the architect guess what they will be? Shall it be his job to crystal-gaze? Or, worse, shall his hasty guess of today shape these things for years to come? Absurd. Here is the place for educational planning. Here is where the educational philosophy of today, designed by school and community folks—with some shrewd guesses as to trends and possible change in the next couple or three decades—comes to the rescue. When the philosophy is determined, for now at least, then the teachers, custodians, supervisors—the whole school staff really rolls up sleeves and gets down to work. They get down on paper—even maybe do a little picturing—what kinds of activity are going to express the accepted educational philosophy. This cannot be done once for all school districts. It has to be done over and over for each situation. Does this philosophy emphasize listening? The read-and-recite activity? Will children work in groups at noisy activity? Will they march to a gymnasium for physical education—or to an art room for art? Will they live pretty much entirely in the classroom? And so it goes. The answers to these and many, many more questions of the sort are terrifically important to the design of the classroom. Back when we talked about the information needed to plan a school building, we touched this lightly. Now we see how vital it is.

There may be some who dispute that what goes on inside a classroom matters so deeply to design. But who will dispute that the room itself will affect for a long, long time what can go on inside it? Not any teacher working in one of the 1890-style buildings. Programs are cramped, are moulded nearly, by the

[3] William W. Caudill and William M. Pena, "What Characterizes a Good School Building?" *School Executive*, 13:6, June, 1951.

[4] Lawrence B. Perkins and Walter D. Cocking, *Schools*, Reinhold Publishing Corporation, New York, 1949, p. 62.

room size and other built-in attributes. Our job is to provide a space that fits, that is tailored to the present program. And we're very mucb concerned that there be cloth enough at every seam—enough to allow for alterations.

Sears in 1925 found that to carry out a functional study of a building would call for a careful classification of the main and subordinate functions served by the building as a wbole, and by eacb of its separate features. He stated [5] "Such a systematic analysis of functions bas not been made by any survey as yet, though an abundance of criticism of buildings from this general viewpoint has been made. Instead of classifying and standardizing the functions to be served by a building, the score cards available, in the main, classify and standardize the different physical features of the buildings." Both the National Council on Schoolhouse Construction and the American Association of School Administrators have pioneered the trend toward functionalism by describing suites of rooms and the relationship and arrangement of spaces as contrasted with isolated units.

Is it sufficient to instruct the school architect to comply with published standards? We must be reminded that school-plant standards, like other normative information, are helpful only to serve as a benchmark on occasion. It should not be assumed that they possess scientific validity. Practically every standard is based upon an assumed educational function and every measurement upon germane facts. When the function changes or is altered or new facts are discovered, the standard becomes obsolete, as explained in Chapter 6. Many building standards have found their way into publications of state departments of education as prudential factors. Other standards are mandatory in state or municipal building codes. Systems of standards have been arranged by school-survey specialists primarily as a means of comparing various buildings. Some standards have been arrived at intuitively or by concensus of opinion and expert judgment. Many standards are rather painstakingly verified by research, yet always upon certain assumptions. Most standards represent an average of the better practice; that is to say, a solution to some common problem has been conceived and found generally acceptable.

The administrative error of perpetuating obsolescent standards by specifying that the school architect must be guided by them has been brought to the fore by recent experiments with new construction methods. Building codes have specified minimum window heights that handicap experimentation with new shapes of buildings and new techniques of illumination. Expensive central ventilation systems have rusted with neglect while the simple elements of natural ventilation could not be exploited by architects because of code restrictions. Regulations concerning ceiling heights and classes of construction are not necessarily ap-

[5] Jesse B. Sears, *The School Survey*, Houghton Mifflin Company, Boston, 1925, p. 129.

plicable in the case of spreading single-story building design. When standards are stated as building features rather than as principles, they do not admit of the invention of compensatory factors.

Strict adherance to published standards in the writing of educational specifications for the school architect is an impractical administrative policy in other respects. Every school district more or less has to establish its own guides or else adjust a system of authoritative standards to unique local factors. For example, high land values or lack of available land in certain city areas may necessitate finding some substitute for what is usually considered minimum size of school site. Many published standards have been expressed in terms of minimums, and economy-minded persons are prone to think that a sum total of the minimums would be quite adequate, whereas such was never the intention of the commission that prepared the statement of standards originally. The purpose usually was to remedy some glaring error of design such as might endanger health and safety or curtail desired learning activities and not to set an objective or impose a rigid prescription on the architect of a new building design. Furthermore, overreliance on standards tends toward uniformity of school design with consequent neglect of new inventions such as removable partitions, air conditioning, nesting furniture, irregular rooms, principles of sight ease, adaptations to climatic conditions, improved mechanical systems, new methods of interrelating learning spaces, and the like. It seems almost contradictory, although true, to say that standards ought to encourage creative departures from such standards.

The standardization movement made a lasting impression both by identifying submarginal conditions in the existing school plants and by preventing many obvious errors in new construction plans. This was explained in Chapter 8. Some currently accepted minimums as to square footage per pupil station and the like were listed in that chapter. Yet the standardizing movement in effect has caused school architects to plan all classrooms to look pretty much alike—the same window location and height, the same chalk boards, even the same yellow walls. The major shortcoming of specific standards was not so much the by-product of schoolhouse sameness as an intrinsic weakness with respect to efficiency and economy. New construction methods have come along and established unforeseen ways to reduce the costs of building while at the same time providing very pleasing functional spaces. What was considered best practice, furthermore, in one locality has proved not necessarily to be the best practice in every locality. More imagination was needed to recognize or originate solutions peculiar to local needs.

Some cities like New York and Cincinnati have [illegible]nted with elaborate school-building manuals. Indeed they [illegible]formation manuals of such excellence for their architects [illegible]uals were

copied by other cities and even used as textbooks. These compendiums of instructions for the city-school architect were the product of extensive research, committee deliberation, and departmental staff work. They represented the most supreme quality in the way of educational specifications that the school board could supply, and accordingly were expected to implement policy and expedite the work of the professional architect. The trend away from use of such school-building manuals is a result of the greater economy and efficiency of studying each proposed project in its own setting of timeliness and environment, even within a large city. Moreover, continually to revise such elaborate and complex manuals proved very laborious.

The true objectives are illumination not lighting fixtures, effective learning situations not pupil stations, long-range utilization not space units, freedom of pupil activity not standard dimensions. Recently an architect designed a gymnasium without side walls for an elementary school in a Southern city. Another architect integrated the covered exterior passages with the classroom activities. What would be the standard dimensions of such a gymnasium or classroom? In commenting on the task of reviewing and approving preliminary drawings for new school buildings, Essex listed nine criteria:[6] (1) safety, (2) comfort and health, (3) beauty, (4) expansibility, (5) flexibility, (6) association of instructional areas, (7) accessibility of facilities, (8) community use, and (9) economy in plan and construction. Back of these principles lies the basic goal of adequacy.

PROCEDURES IN PREPARING EDUCATIONAL SPECIFICATIONS

It must be recognized that participatory planning has its limitations. The task of expressing in definitive terms the educational needs for a school and the children, of formulating a statement on the emerging school philosophy, of predicting even a few years ahead the requirements of the curriculum, program, and instructional procedures is indeed a challenge to educator and laymen alike.

The school administrator, as executive and advisor of the school board, has planning responsibilities that cannot be delegated. After all, the school program is larger than the work of any teacher or any group of teachers. The administrator's function as an educational leader gives him a unique overview of an interplay of influences. He observes the whole effect on the growing child and other beneficiaries of the educational system. Will facilities be required for nursery school and preprimary children? For a junior college level, or other offering beyond high school

[6] Don L. Essex, "Basic Principles of School Building Design," *American School Board Journal*, 116:19–20, January, 1948.

graduation and extending until full employment by industry or entrance into military service? What is the relation of the youth-population census to school enrollment—is the school responsible for meeting the needs of all youth under nineteen years of age? Will there be night school for employed youth? Will the school services be available around the clock and around the calendar? Will every known device from television to vocational shops be provided? Will special provision for the handicapped be made? Will the scope of the school-district organization include provision for adult education and for community programs? Proper decisions have to be reached on scheduling and utilization of special rooms and school grounds.

Many aspects of school organization are distinguishable as administrative policy. Is the vertical organization to be K-4-4-4, 6-3-3, 6-6-2, K-6-4-4, or another pattern? What departments of the school are officially recognized, and what growth of such departments is anticipated? What is the policy on articulation with higher education, termination, graduation, and promotion? What school transportation is and probably will be available? What specific services will be supplied—cafeteria, health, remedial instruction, home teaching, coaching of student activities, and so on? What are the present course of study outlines, the expected changes, and the dominant trends? What ratio of staffing to enrollment is planned? These questions suggest but a few of the growing edges of the school program.

The administrator must recommend to the school board the specializations and quantity of teaching staff, the policies regulating pupils, the particular services to be rendered, the provision for special concentration or allocation of staff time, the operational budget, the directions of expansion and adjustment. Therefore in determining basic educational requirements for a school-plant project the administrator is uniquely responsible for seeing that no major relationship of space or physical environment is overlooked and that all relationships have a direct bearing on the desired experiences of the learning child. The proportionate space allocated for library, playfield, laboratories, auditorium, and classrooms will depend on the concept of service to be rendered.

School administrators have experimented with at least three practical ways to use the knowledge and experience of their staff in functional planning of educational spaces. These are: (1) to have the staff list all the school-plant requirements within their area of assignment or competency, (2) to conduct planning sessions with the staff where they prepare experimental floor-plan sketches, and (3) to test theories with model layouts.

The first and most common of these methods needs little explanation. Nearly all school administrators and architects report that they obtained

useful proposals from the teaching staff who are to work with the new plant by simply asking for a list of suggestions. The chief criticism has been that often under pressure of hasty planning only the building principals or a few of the specialist staff are given even this much voice in school design. Sufficient time ought to be set aside to cultivate staff participation more adequately. Certainly if the staff members are to be ready with an improved educational program for the new plant, they should be involved in the planning.

Various devices have been tried in an effort to bridge from the theoretical approaches explained in the foregoing section to preparation of actual space concepts that will be suggestive and stimulating to the architect.

Measurable Properties of the Educational Program. Rather than loose talk of "projecting, translating, and interpreting" an educational program into school-plant needs, it is helpful to isolate *properties, measurements,* or *relationships* in the educational program which are capable of specification. Among the various elements that may be identified in the educational program, the following lend themselves to mathematical or specific description:

Grouping. In groups ranging up to about twenty or twenty-five pupils the teacher apparently can give beneficial individual attention, but in larger groups more or less mass-instruction procedures tend to prevail. Socialized recitation methods call for assembly of at least several pupils, possibly a minimum of ten or fifteen. Thus class size is a measurable factor in the educational program. For some occasions large assemblages in addition to classroom groups are necessary. The grouping of pupils within a classroom is also measurable. A predominant tendency in the primary grades is to recognize about three distinct groups within each class and seat the children accordingly.

Categories of enrollment. The enrollment is usually broken down into divisions by age, grade, subject, type, or department. The numbers in each category become a useful statistic for planning.

Schedule of activities. The daily schedule gives the deployment of the enrollment among the building spaces. It shows the order or succession of activities for groups or individuals, the length of time devoted to an activity, and the time and space available for informal activities. The schedule may be planned to eliminate occasion for formal study halls and substitute the library center. It will serve to show the stand-by pupil stations, gymnasium, assembly, library, nature-study room, and other laboratories. A schedule prepared for two or more years in advance would indicate how enrollment trends probably will affect the character of building usage.

Efficiency of physical movement. The range of physical activity at a

pupil station is one of the factors in setting square-footage standards for various kinds of pupil stations. Another category of physical movement is that required for mass passage to and from the room, and another activity is teacher supervision of individual work. Physical movements include the obtaining of materials, the arranging and rearranging of furniture, the passage to and visibility of blackboards or displays, and the possibility of occasional large-scale activities such as art work, projects, theatricals, dances, games of movement, and the like. This important special factor can best be measured by experimentation with possible combinations of room contents.

Orientation within class. The lecture concept of teaching has a single point of orientation, the light coming conveniently over the left shoulder. The spread of laboratory methods, however, requires that the classroom environment, illumination, ventilation, acoustics, color, shape, and equipment admit of versatile orientation.

Equipment and furniture. The equipment and cabinet work may be free standing or built in. Information is needed as to desired accessibility, service outlets, safety features, and storage. Manufacturer's specifications and suggested layouts are a guide to space requirements and location for both equipment and furnishings. However, many manufacturers overemphasize heavy, massive furniture. The space demands for special furniture and apparatus have had much to do in the past with standard dimensioning of libraries, science laboratories, industrial arts shops, cafeterias, business-machine rooms, and the like.

Out of doors. The amount and kind of usage of the school grounds is largely a matter of scheduling. In general, not enough of the physical activity is scheduled out of doors. In fact, the building facilities often have a poor relationship to outdoor activity. Some schools have stated play periods; others encourage informal and free access from classrooms to out-of-door areas. A map of the grounds development is usually prepared to show areas of special use, multiple use, and so on. Relationship of such rooms as kindergarten, agriculture department, nature study, gymnasium, or any elementary classroom to proposed use of the out-of-door areas is receiving more attention now that larger school sites have become popular.

Special-use facilities. Obviously many educational functions depend upon facilities for their success. Performances generally need an equipped stage and an audience. Physical education cannot be developed satisfactorily by calisthenics in a classroom. Many learning activities make use of fairly substantial apparatus such as science tables, shop machinery, home furnishings or appliances, and the like. In some respects these special facilities must be of at least minimum size irrespective of enrollment; in other respects space proportions to service load can be

useful proposals from the teaching staff who are to work with the new plant by simply asking for a list of suggestions. The chief criticism has been that often under pressure of hasty planning only the building principals or a few of the specialist staff are given even this much voice in school design. Sufficient time ought to be set aside to cultivate staff participation more adequately. Certainly if the staff members are to be ready with an improved educational program for the new plant, they should be involved in the planning.

Various devices have been tried in an effort to bridge from the theoretical approaches explained in the foregoing section to preparation of actual space concepts that will be suggestive and stimulating to the architect.

Measurable Properties of the Educational Program. Rather than loose talk of "projecting, translating, and interpreting" an educational program into school-plant needs, it is helpful to isolate *properties, measurements,* or *relationships* in the educational program which are capable of specification. Among the various elements that may be identified in the educational program, the following lend themselves to mathematical or specific description:

Grouping. In groups ranging up to about twenty or twenty-five pupils the teacher apparently can give beneficial individual attention, but in larger groups more or less mass-instruction procedures tend to prevail. Socialized recitation methods call for assembly of at least several pupils, possibly a minimum of ten or fifteen. Thus class size is a measurable factor in the educational program. For some occasions large assemblages in addition to classroom groups are necessary. The grouping of pupils within a classroom is also measurable. A predominant tendency in the primary grades is to recognize about three distinct groups within each class and seat the children accordingly.

Categories of enrollment. The enrollment is usually broken down into divisions by age, grade, subject, type, or department. The numbers in each category become a useful statistic for planning.

Schedule of activities. The daily schedule gives the deployment of the enrollment among the building spaces. It shows the order or succession of activities for groups or individuals, the length of time devoted to an activity, and the time and space available for informal activities. The schedule may be planned to eliminate occasion for formal study halls and substitute the library center. It will serve to show the stand-by pupil stations, gymnasium, assembly, library, nature-study room, and other laboratories. A schedule prepared for two or more years in advance would indicate how enrollment trends probably will affect the character of building usage.

Efficiency of physical movement. The range of physical activity at a

pupil station is one of the factors in setting square-footage standards for various kinds of pupil stations. Another category of physical movement is that required for mass passage to and from the room, and another activity is teacher supervision of individual work. Physical movements include the obtaining of materials, the arranging and rearranging of furniture, the passage to and visibility of blackboards or displays, and the possibility of occasional large-scale activities such as art work, projects, theatricals, dances, games of movement, and the like. This important special factor can best be measured by experimentation with possible combinations of room contents.

Orientation within class. The lecture concept of teaching has a single point of orientation, the light coming conveniently over the left shoulder. The spread of laboratory methods, however, requires that the classroom environment, illumination, ventilation, acoustics, color, shape, and equipment admit of versatile orientation.

Equipment and furniture. The equipment and cabinet work may be free standing or built in. Information is needed as to desired accessibility, service outlets, safety features, and storage. Manufacturer's specifications and suggested layouts are a guide to space requirements and location for both equipment and furnishings. However, many manufacturers overemphasize heavy, massive furniture. The space demands for special furniture and apparatus have had much to do in the past with standard dimensioning of libraries, science laboratories, industrial arts shops, cafeterias, business-machine rooms, and the like.

Out of doors. The amount and kind of usage of the school grounds is largely a matter of scheduling. In general, not enough of the physical activity is scheduled out of doors. In fact, the building facilities often have a poor relationship to outdoor activity. Some schools have stated play periods; others encourage informal and free access from classrooms to out-of-door areas. A map of the grounds development is usually prepared to show areas of special use, multiple use, and so on. Relationship of such rooms as kindergarten, agriculture department, nature study, gymnasium, or any elementary classroom to proposed use of the out-of-door areas is receiving more attention now that larger school sites have become popular.

Special-use facilities. Obviously many educational functions depend upon facilities for their success. Performances generally need an equipped stage and an audience. Physical education cannot be developed satisfactorily by calisthenics in a classroom. Many learning activities make use of fairly substantial apparatus such as science tables, shop machinery, home furnishings or appliances, and the like. In some respects these special facilities must be of at least minimum size irrespective of enrollment; in other respects space proportions to service load can be

established. The size of library has a relationship to classes; the auditorium to total building capacity; the cafeteria to enrollment. Likewise decisions must be made as to number of teacher stations for special subjects such as homemaking, typewriting, laboratories, art rooms, and instrumental music.

Administration spaces. A job analysis would show what space is required by various administrative, supervisory, and special personnel. Among the needs are space for school-board meetings, small conference groups, counseling, storage, public access, duplicating machinery, public-address equipment, medical suite, and teacher's rooms. Many modern schools include a curriculum and resource center. The administration rooms may be centralized or decentralized. The latter policy would locate offices near student functions; the former would enhance flexibility of layout. Any attempt to predict future practice regarding office space for teachers would be quite uncertain. The probability is that demand for office space to be used by the professional staff and others will change as much in the next fifty years as it did in the past century.

Student activities and adult use of school plant. In addition to classrooms a series of specific requirements for informal activities may be listed. These may include student lounges, student supply store, exhibit cases, snack bar, cafeterias, lost-and-found offices, out-of-door patios, lockers and showers for visiting teams, music practice rooms, night-time illumination system for playfields or stadiums, parking spaces and driveways, small offices for journalism and student finance, special facilities for control of spectators, large covered porches, zoning of the building, equipment storage, large-size stage, and similar items.

Emerging concepts. Analysis of the existing program discloses in many schools that most of the school day is spent in training individual competence, fundamental skills, knowledges, and habits for vocational success. Very little time is spent on learning self-reliance, consideration for others, leadership, creativeness, appreciation of values, judgment, or developing an inquiring mind to think and seek information for oneself. Little time is given to health and physical development for all the children. Some time is devoted to American citizenship—home living, ethics, teamwork, processes of government, and civic responsibility. As emphasis on these various curriculum areas matures, and possibly more time and attention is given to underdeveloped aspects, the space specifications will expand and change in their details. Some progressive school architects believe that the "developmental tasks" of youth are a surer guide to long-range functionality of schools than either objective or curriculum planning. Thus any effort to measure the educational program in terms of functional space has to allow for emerging concepts.

CHECK LIST OF MEASURABLE PROPERTIES

General factors

1. Anticipated enrollment by grades
2. Proposed staffing, number and positions
3. Nonprofessional employees, secretaries, bookkeepers, maids
4. Size of classes
5. Special-activity groups
6. Size of large groups, assemblies, play groups
7. Conference and clinic activities
8. Estimated number of spectators
9. Community use of school plant
10. Adult education classes, type and amount
11. Visiting teams
12. Community recreation
13. Number using cafeteria daily
14. Regular usage of buildings by hours per day and months per year
15. Stadiums, nurseries, etc.

Instructional patterns

1. Philosophy of school as to teaching method: lecture, project, activity
2. Types of instructional programs: college preparatory, vocational programs, general education programs, elective subjects
3. Product of the school: pupils' backgrounds, per cent attending college or advanced education, occupations entered by graduates, dropouts
4. Classes divided into groups for instructional purposes
5. Departmentalization, by grades
6. Homerooms, activities
7. Study halls, size
8. Library usage, accessibility
9. Schedule of student activities
10. Parts of building not used the entire day
11. Laboratory activities, including homemaking and agriculture or vocational arts

Schedule of activities

1. Daily program, secondary school, elementary
2. Normal-size group for each space, each hour
3. Types needed of special rooms, shops, laboratories
4. Schedule of general spaces, auditoriums, lunchrooms, library, gymnasium, playfields
5. Evening-school schedule
6. Summer-school schedule

Equipment requiring standing or operational space

1. Single pupil stations, fixed or movable
2. Multiple-unit pupil stations, fixed or movable
3. Teacher stations, fixed or movable
4. Chalk boards
5. Display boards
6. Auxiliary tables
7. Storage cabinets, fixed or free standing
8. Wardrobes, fixed, built in, or free standing
9. Library shelving and equipment
10. Work benches
11. Power machinery
12. Sinks and drinking fountains
13. Office equipment
14. Special-facility stations

Administrative spaces

1. Administrative personnel: principals, supervisors, others
2. Service personnel: nurses, doctors, counselors, cafeteria manager
3. Work space for clerks, and special equipment stations
4. Student-activities rooms: athletics, finance, publications, etc.
5. Conference rooms
6. Teacher lounge and study rooms
7. Student lounges
8. Curriculum and resource center
9. Visual-aids center
10. Museum or display
11. Book and supply center
12. Custodian's office and workshop
13. Departmental directors' offices: physical education, music, dramatics
14. Community offices: PTA, citizens committees, etc.
15. Science workrooms

Storage requirements

1. Special subjects: science, art, music, physical education
2. Physical education lockers
3. General lockers
4. Wardrobes
5. Custodial supplies
6. Cafeteria food storage
7. Furniture storage
8. Community-activity storage
9. Stage equipment

Site usage and transportation requirements

1. Playgrounds for age groups
2. Athletic fields and play courts
3. Special equipment
4. Agriculture usage
5. Parking areas
6. School-bus storage and maintenance shops
7. Bus-loading platforms
8. Utility driveways

Interrelationship of spaces

1. Location of administration rooms for supervision, central access, and public office
2. Convenience of library to class groups
3. Accessibility of general spaces for spectators
4. Opportunity for expansion of major departments
5. Isolation of noise factors: play groups, music practice, power machinery
6. Age groups separated in corridor circulation, lavatories, playgrounds
7. Encourage use of out-of-door areas for instructional activities
8. Isolation of odors from cafeteria or boiler stacks

Establishing a Planning Center. A means of encouraging the staff to participate in preparation of educational specifications is to set aside a conference room where materials may be displayed and committee meetings conducted. The room should be furnished with conference tables, book shelves, wall display areas, and storage. It can be made attractive with resource materials and serve as depository for plans and exhibits.

Exposing the staff to numerous problems and solutions. Perhaps no method is more effective than visitation to several outstanding new schools and careful evaluation of what is observed. Such visitation by responsible staff members takes some time and systematic planning. It is exceptionally effective, however, in producing superior new plans based on broader experience and vision. In fact, most school architects would profit from cooperating with the staff in a visitation program. The planning center itself should supply an abundance of reading materials showing how creative architects have recognized and solved the functional problems of plant design.

Floor-plan sketches. A very productive device is for the staff to represent their ideas in the form of sketches on floor-plan layouts. This requires no special drafting skill or training on the part of the teachers since rough sketching will serve the purpose quite satisfactorily.

The school administrator may direct a succession of steps leading to the production of adequate floor-plan sketches as follows:

1. Staff meeting on the community factors and needs to be met

2. Staff exploration of the basic philosophy, issues, and objectives
3. Preparation by each staff member of an extensive list of the facilities he would like to have in order to carry out his work acceptably
4. Staff study of best practices
5. Planning sessions where practice may be had in drawing model floor-plan sketches
6. Preparation by each staff member of thumbnail floor-plan sketches illustrating various solutions to his particular space and facility need

Creative sketching is a familiar process in all architectural production. Idealistic layouts are made, rejected, or accepted, and eventually consolidated into an efficient product. Many modern functional building designs express the "work-space" concept.

Just how far the school administration will wish to go in the way of evaluating, combining, or accepting these staff-made sketches is a matter of local policy. In the judgment of the authors the consolidation of plan-sketch ideas and the achievement of space economy is the architect's job. The final product of the architect's office may bear little physical resemblance to the staff-made sketches. Nevertheless these sketches will have accomplished their purpose if inclusiveness and adequacy are achieved. The architect is essentially responsible for producing an economical and efficient plan.

A group of teachers working cooperatively in the preparation of sketch layouts may adopt a check list of what should be shown on their sketches. Some rather general check list such as the following would be useful when instructing the staff on the process by which plan sketching becomes a medium for communication of work-space and facility concepts (step 5 above). More detailed lists could be prepared for special room areas.

CHECK LIST OF ITEMS TO BE SHOWN ON FLOOR-PLAN SKETCHES

Drawing to scale (or shown by symbols)

1. Walls and partitions, exterior and interior
2. Dimensions of spaces
3. Windows, transoms, skylights
4. Doorways
5. Passageways, corridors
6. Sinks in rooms
7. Wardrobes, lockers
8. Built-in storage areas, cupboards, display cabinets
9. Storage cabinets (dimensions)
10. Book shelving or book cases
11. Visual-aids installations

12. Teacher's desk and chairs
13. Auxiliary tables and chairs
14. Pupils' desks and chairs
15. Filing cases
16. Wall treatment, chalk boards, tack boards, map rails
17. Electric outlets
18. Activity and interest centers

Descriptive data (shown by legend)

1. Ceiling height
2. Window height
3. Lighting fixtures
4. Floor material
5. Color scheme
6. Acoustical treatment

Related areas (shown by arrows)

1. Restrooms
2. Out-of-doors areas
3. Library
4. General storage
5. Associated rooms or activity areas

Model layouts. Other devices for studying and identifying desirable layouts have been used successfully. An interesting scheme is construction of scale models. A magnetic board on which physical features of the room and its equipment fabricated to scale are moved about to show possible relationships and alternatives is useful for this purpose (Figure 12-2).

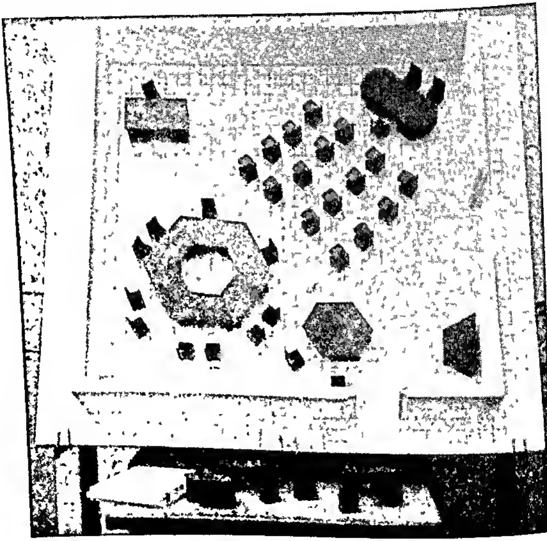
Where the school system affords a variety of space situations, it is possible to arrange and rearrange furnishings of existing rooms and study the relative efficiency of the potential space utilization in this way. Types of furniture, storage space, and special-equipment layout that best serve the classroom needs are often decided in this empirical manner.

Committee Hearings on Studies and Proposed Plans. A clear concept of the basic educational requirements and their implications for long-range development emerges from specific, objective investigations and careful organization of data, but the interpretation of data has to be tested frequently in round-table discussions where a variety of interested parties participate. Among the significant subjects that warrant committee hearings in the early stages of planning are these: (1) administrative policies concerning the school-system organization, (2) philosophy and purposes of the school staff, (3) relationship of building units to the total program, (4) types of special-plant facilities required for various instructional departments, (5) space per pupil station necessary for efficient

teaching, (6) allowance for major change and possible expansion in the scope of the school program, (7) suggested multiple use of spaces, (8) various room capacities required for the educational program.

Later the entire documentation of educational specifications should be

Fig. 12·2. A magnet board and scale-model furniture are useful for planning experimental layouts. (*Administrative Education Department, University of Houston, Houston, Tex.*)



reviewed by the total staff. Again later on, the staff should examine and recommend for school-board approval the architect's preliminary sketches and outline specifications. As the New England School Development Council has stated,[7] it is in the sketching of the floor plans that the architect shows his skill in interpreting the educational needs of the community, in providing the material surroundings for good teaching.

[7] *Op. cit.*

and in solving many administrative problems. This takes a great deal of time and patience. Building committees should realize that this part of the planning should not be rushed under pressure. Group dynamics is a proved method of stimulating creative ideas and forming judgments.

Teaching Activity the Criterion in Space Planning. In our New England cities may be found jewels of elementary school architecture built more than a century ago. Constructed of masonry, they often have sweeping arches and steep slate roofs, a huge central hall with a great center stairway, and spacious, frequently square classrooms. At first there were no principal's offices in these schools, but offices were added later by perhaps partitioning the hallway at the head of the stairs. Communities today would not seek to exhibit a lesser taste for beauty; but they also want a school that embodies the most efficient possible solution to the current scope and future concept of community activity and educational program. An architect primarily concerned with designing a school as a functional tool of education would find a flow chart of the association of spaces suggestive.

The tendency to classify educational spaces according to their function and to establish minimum square footage of floor area for each category of room has safeguarded against planning too specifically for anticipated activities. A given square footage per child as the minimum rule in the self-contained elementary classroom, for example, has actually produced flexibility because it contains leeway for introduction of a variety of teaching methods in future years. Naturally, the layouts for library, offices, cafeterias, shops, science rooms, dining rooms, home economics rooms, and so on have evolved from the furniture and equipment market, and until now most of the research has been done by furniture- and equipment-supply houses. A standard science room is an example. Much of the research and planning conducted by equipment- and furniture-supply houses has been very beneficial. Yet little of the commercial planning has been in terms of a genuine job analysis of the desirable teaching methods, or of group activities, or of space relationships in the daily school schedule. More careful observation and experimentation by educators and school architects is needed. Caudill demonstrated seven different ways of arranging flexible seating in an elementary classroom before arriving at his recommendation that each classroom have at least 35 square feet of floor space per pupil.[8] Considering the uses to which movable furniture is put, and the current demand for work space, running water, visual aids, storage cabinets, library corners, and group projects, this standard does not appear unreasonable for the so-called self-contained elementary classroom.

Remarkable innovations in building design have resulted from ac-

[8] William W. Caudill, *Space for Teaching*, Bulletin no. 59, vol. 12, no. 9, Engineering Experiment Station, A & M College of Texas, College Station, Tex., 1941.

ceptance of a new teaching method. Direct exits from the self-contained classroom to the paved, out-of-door classroom area are a current example. The size and shape of gymnasiums are obvious responses to the popular court layout of various sports activities. The size of laboratories and classrooms in the departmentalized high school is largely the outcome of choices made as to scheduling of different types and sizes of classes. Numerous practical adaptations appear in the plans of high school special rooms, ranging from elevated seating for science-demonstration classrooms to ramps and work spaces in the machine-shop classrooms.

The nature of the curriculum will determine many of the space requirements. The number of periods per week scheduled for each child in physical education will affect the gymnasium, dressing-room, and playfield space allocation. The practice of laboratory teaching in all its variations adds to the need for special laboratory-type rooms. The rural consolidated school district may decide to have a major agricultural project that calls for tillable land and pasture as well as regular farm buildings. The homemaking department may need to be of a size that will occupy a half or a third of the school day for a large percentage of girls. The library can be set up as the major reading center for general education. Probably vocational education in a broad sense is the least well developed of all high school subjects today, and the curriculum demand for properly equipped vocational rooms may increase either at the high school or junior college level in the years ahead.

Functionality in Design. Once the principle is accepted that the child is the yardstick, the adequacy of studies and plans should be reviewed from the standpoint of functionality. The criteria for emphasis are:

1. That not one but many different kinds of group activities occur daily in a room
2. That the teacher-pupil-pupil orientation is not a fixed circumstance but faces in many different directions during the day
3. That the school curriculum, and consequently the exact use of a schoolroom, cannot be predicted many years in advance
4. That it is important to know the focal point of services such as guidance or library, whether administratively centered or classroom centered
5. That the association of different instructional areas is important because the teacher should use many resources
6. That accessibility of special facilities has considerable influence on how the teacher executes his program of learning activities
7. That careful staff studies of departmental programs reveal many unmet needs, largely overlooked because of insufficient participation in the planning
8. That the scope of the educational program is more than the sum total of formal lessons learned for credit

9. That the attitude of children is a major factor in their learning activities
10. That the school is a part of community life
11. That school buildings should be adaptable to changing enrollments and changing conditions
12. That educational programs are and probably will be responsive to new technology, illustrated in school transportation, sanitation, and safety, flexible construction methods, audio-visual aids, new kinds of apparatus, and the like

Preparation of Staff Study Reports. At the outset some attention should be given to the manner of reporting staff studies. No interesting or significant data should be thrown away. However, a brief report of findings and conclusions is needed (in several copies) for reports to the school board, for publicity, for use of other committees and specialists preparing a master plan, and for information of the architect.

It is suggested that the staff studies be reported in three parts: (1) facts and conclusions, (2) procedures and tabulations of data, and (3) source materials or evidence (keyed to section 1). Thus it will be possiblo to retrace and verify all investigations as to reliability of source data and validity of method. Those preparing staff reports should be encouraged to construct a few simple maps, graphs, charts, and tables for display.

SUMMARY

The school architect should be retained as early as possible in the school-plant program so that he may assimilate tho objective data and produce an economical and creativo solution. The school staff should develop a long-rango program and convey technical information to the architect in the form of educational specifications approved by the board of education.

The local school program will have its own individuality derived from its own community factors, but also it is part of the cultural stream of the nation as voiced by national statements of educational aims and as illustrated in what the better schools are doing throughout the country.

To achieve a balanced plan there must be staff studies to establish objective information. However, the ultimate design should result from teamwork in which the architect is held to performance goals rather than rigid standards or fixed patterns. This is accomplished by understanding what information an architect requires.

Architects differ in the amount of detailed instruction they need, but all factors of educational load, teaching activity, special facilities or equipment, and purpose or use must be made clear for each building project. The ways of communication between school staff and architect include written schedules, informal conferences, and formal hearings.

Functional planning is based on the theory of analysis of activity. Some staff members produce sketches or use check lists [illegible] than they can apply

mathematical standards. All should be invited to participate in the final review of proposals. The functional criteria of school-plant design revolve about the teaching process and utilization of the plant as an educational and community institution. The staff should be ready with an improved educational program at the time a new building is occupied.

The school administrator cannot delegate all his responsibility in a building program, but he can improve the effectiveness of the product by organizing staff participation according to the competence of the individuals concerned. He can reassign responsibility for staff studies, encourage the use of staff talent and resources, and achieve a common basis of communication. It requires patience to unite the specialists of a school staff in studying the measurable properties of an educational program.

DISCUSSION PROBLEMS

1. What are characteristics of performance goals that would assist the architect to develop a superior plan without needlessly limiting his freedom?

2. Illustrate the relationship between size and arrangement of classroom space and the variety of instructional methods that the teacher can and does employ.

3. Develop an annotated bibliography of published "guides" and illustrative designs that would serve as teacher resources in group planning of educational specifications for each of a score or more types of school spaces.

4. Demonstrate the architectural and educational advantages of various types of roof structure and spans.

5. Illustrate several novel outdoor-indoor arrangements that have emerged in recent years from experimentation with single-story plans of schoolhouse construction.

6. To illustrate a problem in determining the capacity of high school buildings, let us assume that a district has two high schools built within the past twenty years. Each was designed to accommodate by the architect's planned capacity 800 students. However, high school *A* has half again more usable square feet of floor area than high school *B*. How may the real capacities of the two high schools be established?

7. An interesting study of classroom layout can be made by drawing the perimeter of the proposed classroom or laboratory to scale on cross-section paper. Then make cutouts of furniture, equipment, cabinets, etc., to scale and experiment with different arrangements of floor-plan layout. Consideration must be given to use of "teaching walls," efficient circulation, fenestration, and utility outlets.

8. Prepare a flow chart illustrating the functional interrelation of educational spaces.

9. What are the factors which should determine the size of an auditorium?

10. Thinking in terms of your teaching specialty, prepare an outline of the items you would like to have an architect consider, for example, space for exhibits, storage of children's book and materials, freedom from interruptions, open-shelf library, place to interview parents, disposal of paste and paints,

clipping file, flat storage of charts and pictures, general storage on each floor, trapezoid tables, permanent equipment.

RELATED READINGS

Association of School Business Officials: *Data to Be Furnished Architects by Board of Education*, Bulletin no. 15, Kalamazoo, Mich., 1952.

Carpenter, W. W., and others: *Schoolhouse Planning and Construction*, no. 5, Missouri State Department of Education, Jefferson City, Mo., 1946.

Caudill, William W.: *Space for Teaching*, Bulletin no. 59, vol. 12, no. 9, Engineering Experiment Station, A & M College of Texas, College Station, Tex., 1941.

———: *Toward Better School Design*, F. W. Dodge Corporation, New York, 1954.

Cincinnati Public Schools: *Manual for Architects*, Board of Education, Cincinnati, Ohio, 1947.

Clevenger, Arthur W.: *Planning Elementary Buildings for School and Community Use*, Bureau of Educational Research, University of Illinois, Bloomington, Ill., 1951.

Cypher, I. F.: "Planning Schools in Which Newer Education Materials Can Be Used," *Nation's Schools*, 49:68, January, 1952.

Department of Education, State of Ohio: *School Plant Construction and Rehabilitation*, Columbus, Ohio, 1951.

Division of School Buildings and Grounds, New York State Education Department, Albany, N.Y.—School Building Planning Pamphlet Series:

Planning the Elementary School Classroom

Planning the School Health Suite

Planning the Science Facilities for Central Schools

Planning the Indoor Physical Education Facilities for Central Schools

Planning the Outdoor Physical Education Facilities for Central Schools

Planning the Music Suite for Central Schools

Planning the Business Education Facilities

A Planning Guide for Vocational-Industrial and Vocational-Technical Building Facilities for Comprehensive High Schools

Planning the Agricultural and Industrial Arts Shops for Central Rural Schools

Planning the School Auditorium

Planning the Central School Library

Housing the Audio-Visual Program

Heating and Ventilating Recommendations for New York State Schools

Visual Comfort and Efficiency in School Buildings

Fire Safety in the Planning of School Buildings

Educational Policies Commission: *Education for All American Youth*, National Education Association, Washington, 1944.

Engelhardt, N. L.: "Building Manuals for Schools Systems," *The American School and University*, 19:38–51, 1947.

———: "Translating Educational Planning into a Plant Program," *School Executive*, 70:57–61, August, 1951.

Engelhardt, N. L. and others: *Manual of School Planning*, Board of Education, New York, 1947.

———, N. L. Engelhardt, Jr., and S. Leggett: *Planning Secondary School Buildings*, Reinhold Publishing Corporation, New York, 1949.

———, ———, and ———: *Planning Elementary School Buildings*, F. W. Dodge Corporation, New York, 1953.

Essex, D. L.: "Planning the Central Rural School as a Community Center," *American School Board Journal*, 110:47–48, May, 1945.

Herrick, John W.: "The Development of Educational Specifications in Planning the Secondary School Plant," *Bulletin of the National Association of Secondary-school Principals*, 32:213–219, March, 1948.

Junior High School Study, Caudill, Rowlett, Scott, and Associates, Bryan, Tex., 1955.

New England School Development Council: *Conducting a School Building Program*, Cambridge, Mass., 1947.

New Hampshire State Department of Education: *Guide for Planning the Construction of School Buildings*, Concord, N.H , 1952.

Norrix, Loy: "Some Advantages of the Single Story Schoolhouse," *Nation's Schools*, 47:54–57, May, 1951.

Pena, W. M.: *Programming the Liberty Schools*, no. 9, Caudill, Rowlett, Scott, and Associates, Bryan, Tex., 1954.

Perkins, Lawrence B., and Walter D. Cocking: *Schools*, Reinhold Publishing Corporation, New York, 1949.

Pittenger, B. F.: "Some Observations about High School Buildings," *American School Board Journal*, 118:35–36, January, 1949.

School Executive, "Educational Planning—Planning the School Plant," Symposium, 67:37–52, December, 1947.

Sears, Jesse B.: *The School Survey*, Houghton Mifflin Company, Boston, 1925.

Sellew, Roland W.: "What Information Should Educators Furnish the Architects?" *American School Board Journal*, 130:49–50, May, 1955.

Shaw, Archibald: "A List of Equipment for Class-rooms in a Modern Elementary School," *The American School and University*, 20:283–286, 1948.

———: "Educational Planning of Schools," *School Executive*, 73:84–85, January, 1954.

Stone, Harry W.: "The Educational Basis for Planning a Functional Self-contained Classroom," *American School Board Journal*, 128:31–32, January, 1954.

Texas Education Agency: *Programming School Needs—Manual*, Austin, Tex., 1952.

U.S. Office of Education: *Offerings and Enrollments in High-school Subjects, 1948–49*, Washington (*Biennial Survey of Education in the United States, 1948–50*), 1951.

Wilson, Russell E.: "Planning the Content for Educational Specifications," series on educational specifications, *Nation's Schools*, 56:75–79, November, 1955.

Wright, Henry: "What Does School Air Conditioning Cost?" *American School Board Journal*, 136:33–34, January, 1958.

PART THREE

Project Administration

CHAPTER 13

Legal Problems and Services

A school-building project cannot be advanced very far without becoming involved in state or local laws. The acquiring of a site involves clearing title and legal transfer of title. It may require condemnation proceedings where allowed by law. Authorizations, public notice, approvals by state and/or local governmental agencies, or a vote may be required. Similar steps or different steps may be required relative to construction or capital-outlay financing.

The school administrator should be familiar with major legal problems relating to providing school facilities and with the laws of the state in which he is operating as they relate to land acquisition, capital financing, approvals of plans and specifications, and school-facility construction. Most of the legal problems could be handled by the school attorney. However, it is prudent also to engage a bond attorney since this step usually results in savings.

MAJOR LEGAL PROBLEMS

The legal problems will vary according to the laws of individual states, but the following list should be helpful in examining the laws in any state.

Contracts. Many of the problems involve contracts. What authority or power does the school board have to enter into various contracts? What limits are placed upon certain contracts? What conditions must be complied with in entering into contracts? Does the contract protect the interests of the school system? Are the provisions such as to specify clearly what the school board is to get by way of goods or services or both? Do the provisions as to payment sufficiently protect the district in case of

failure to complete the agreement? Does the contract conform to proper legal forms? Is the contract properly signed and witnessed?

Real property. What are the powers of the school board relative to the sale and purchase of real property? What steps should be taken to obtain binding options to buy? What approvals must be obtained from other governmental agencies in acquiring real property? What has to be done to obtain clear title to property? What requirements have to be met relative to notification, records, and filing? What zoning or building-code provisions have to be complied with? What are the liabilities of the school board? What steps must be taken relative to water, public utilities, sidewalks, and street access? What powers of eminent domain are given school authorities? How may the local unit acquire property by condemnation? What approvals are required from other governmental agencies in acquiring land?

Finance. What are the powers or limitations relative to borrowing and taxation for capital outlays? What provisions are made for Federal or state aid for school facilities? How does a school system qualify for such assistance? What authorizations, referenda, approvals, or elections are required to raise money for school construction? Under what conditions may transfers be made from current funds to building funds? What are the legal requirements relative to the capital budget, accounting for capital funds, and their audit? May the school system create reserves or balances for capital purposes? May the locality invest capital funds? What are legal investments for such funds? What are the laws relative to premiums on school bonds? What laws have to be complied with in issuing bonds? May the school system borrow in anticipation of bond sales? For how long?

Liability. What liabilities may a district incur from site ownership? What liabilities may result from certain conditions as to adjoining properties? What types of bonds or insurance should be provided at various stages in a school-building project?

Personnel. What is the power of the school board to engage various types of personnel? What are the laws relative to payment for such services? What laws have to be adhered to in selecting or employing such personnel? What approvals are required?

Plans and bids. What approvals or review are required for plans and specifications? What laws or local code requirements have to be complied with in plans and specifications? What are the legal requirements relative to advertising for bids? Performance bonds or other requirements? Receipt and opening of bids? Acceptance of bids? Rejection of bids?

Boundary changes. What are the powers of school authorities relative to changing the boundaries of the local unit? What approvals are re-

quired? What steps have to be taken in reorganizing a local school unit? What provisions are made for disposing of property or other assets of former units? What provisions apply relative to the debt of former units?

Digest of State Laws. An abstract or check list of the state laws requiring compliance in school construction is useful for the local school administrator. Such a digest may be prepared by the local school attorney or be obtained from the state education agency.

Questions may occur as to the legal provisions on paying for initial studies and preliminary plans. The laws of some states are specific on the point of whether the costs of architect's and surveyor's services incurred prior to the bond authorization can or cannot be paid out of the proceeds of the bond sales.

The following view of legal counsel applicable in New York State is of general interest: [1]

> It has been our view over the years that boards of education, in order to submit propositions for building purposes to the voters of the district, had to base the figures used in such propositions on preliminary plans and estimates for the purpose of enabling the voters to intelligently decide the questions involved. . . . It is our view that the board of education has legally the right to expend all sums reasonably necessary for such purpose without a vote of a special meeting. As to the question of financing such expenditures, the provisions of the Local Finance Law apply. Where the amount was not included in the budget . . . the only method of financing would be by issuing budget notes.

RETAINING LEGAL COUNSEL

The practice which has grown up in certain sections of the country of paying local legal counsel a percentage of a bond issue does not necessarily result in a reasonable cost for the kind of legal service required. As indicated in the preceding section, most of the legal work involved could be handled by a competent school attorney. Where a school system is engaged in a continuous school-building program, the annual compensation of the attorney would be sufficient to include such work as part of his regular duties. Where a school system engages in such work only occasionally, a fixed amount should be agreed upon for additional work. When the school attorney is unable to undertake the additional responsibilities, his advice should be sought in retaining competent legal counsel. What individuals and private organizations pay for such services in a particular locality provides one norm for reasonable cost.

From the start of a school-bond authorization and issue, a firm of recognized bonding attorneys should be engaged in order that all notices,

[1] From letter by Charles A. Brind, Jr., Counsel for New York State Education Department.

Where a building fails of final acceptance and the final payment to the contractor is withheld, a compromise settlement may be effected, or the school attorney may have to defend the school district's position in court.

Agreements with Professional Personnel. A properly drawn contract with consultant, surveyor, architect, engineer, and other professional personnel is conducive to good workmanship. The architect's contract should clearly state the types of service to be rendered (refer to Chapter 17).

One form of contract not discussed elsewhere in this text is that with the educational consultant. These contracts are not as standardized as others discussed above and could result in misunderstanding unless carefully executed. An agreement with an individual or agency engaged to conduct a survey of school-building requirements may be contained in an exchange of correspondence but should state explicitly the expected accomplishments, the degree of cooperation, the scope of responsibility, the duration of the services, the termination date, and the fee to be paid. For example, an agency undertaking a survey may state as their proposal (1) that they agree to conduct a cooperative survey of the school-building requirements of the named district or districts, (2) that the survey shall include community needs, school-population estimates, evaluation of the existing buildings and sites, possible building requirements, available ability of the locality, plans for possible district consolidation, and recommendations both immediate and long range as to school-building programs, (3) that the agency will provide experienced, competent personnel to direct the inquiry and prepare the report, (4) that the local unit will compile and provide certain materials, such as necessary statistical and technical data, informational maps, studies of the educational program, and other information for a complete interpretation of the problem as needed for the survey to be directed by the consultant, (5) that consideration for direction of the survey shall be a certain amount payable upon delivery of the final report to be available on or before a set date, and (6) that the school system agrees to publish the report at an approximate cost stated. The school board then may accept the proposal.

Site Acquisition or Sale. Purchase and disposal of land are the most common legal transactions requiring the services of a school attorney. There are question of negotiation, school-board resolutions, legal authority, court proceedings, examination of abstracts, deeds, easements, contract to purchase, title clearance, drawing of deed, recording of deed, and other phases of site acquisition. The attorney searches the title and investigates such restrictions as rights of way, zoning ordinances, utility services, and the like. One of his important services is preparation of

necessary resolutions for the school board to enact. The purchase and transfer of property could involve condemnation proceedings or other kinds of claims that demand an attorney's attention.

Many different types of problems can arise in various site acquisitions. Sometimes it may be necessary to obtain options. There may be a serious problem in clearing a title. Eviction proceedings may be necessary to clear the site for excavation and development. There may be problems of zoning. In some cases approvals of other governmental agencies may be required. Liabilities may be incurred. These and similar cases are within the scope of the work of the school attorney.

Other Work. It is well to have the school attorney investigate applicable building codes. He can advise on conflicts over responsibility for sewers, utilities, sidewalks, and other civic services, or over supervision, nuisances, liability, and compensation related to the construction project. The attorney's services also may be needed in certain applications for state or Federal grants or in proceedings to alter boundaries or to reorganize the local unit.

Correct interpretation of the law is essential with respect to authority of the school board, required resolutions, call of the election, preparation of ballots, eligibility of voters, election procedures, records, and reports. School-board resolutions on contracts and tax levies must follow due process. The taxpayers or others are entitled to sue if resolutions are passed at other than duly called and conducted school-board meetings, or if a referendum does not comply with the statute, or if there is evidence of willful evasion of any of the legally directed actions.

Records of Decisions. Minutes of a school-district election or meeting to authorize school bonds and/or construction should show time, place, and purpose of the meeting or election, all resolutions and votes taken, and all special authority delegated to school officers. The minutes of such meetings or elections should be orderly and convey a clear and complete record of initial petitions, hearings, board actions, authorization for district meetings or elections, citations to law regarding validity, the official call of the meeting, the information distributed, the conduct of the meeting or election, the certification of the vote, and reports or records filed in consequence. It is customary to paste into the minute book original reports published and presented to voters by the clerk, treasurer, and school board, and the authentic copies of all public notices, advertisements, and printed ballots.

The minutes of school-board meetings should contain a record of all formal or informal action, reports, petitions, and testimony received by the board. The clerk of the board should be instructed to keep a systematic file of all reports, documents, and correspondence in connection with the official meetings. Minute books can be loose leaf, if pages

are numbered to prevent tampering, and certain routine report forms as monthly budget control of the capital-improvement fund, superintendent's project-progress reports, and schedules of preaudited invoices can be prepared on minute-book paper for pagination and binding into the records. More lengthy written resolutions, statements, data, and proposals can be referred to by subject, author, date, and document file number. The minute book should be indexed for easy reference.

Records kept in the board minute book pertaining to a particular school-plant project may extend over several years. These records will show all agreements entered into on behalf of the district and such elements of contracts as plans and specifications and contractor's representations and bonds. Correspondence and resolutions are legally important since they may be construed as a contract. The minute book should record with proper reference all authorizations of payments made. Full records should be kept of formal applications to other government agencies and such important correspondence as will affect decisions on contracts. Having a complete record of plans, estimates, proposals, recommendations, and decisions helps protect the interests of the school system.

WORK OF THE BOND ATTORNEY

The work of the bond attorney is highly specialized and is rather standardized throughout the country. His chief function is to certify as to the legality of the bond issue. If he is nationally known, his certification will enable the district to obtain the most favorable interest rate possible on its borrowing. The bond attorney can prepare proper transcripts for credit ratings and negotiate bond sales. He can transact any necessary certification of the bonds for the school district. He can also assist the school board to prepare an efficient debt-service plan and institute proper records and procedures for meeting fiscal obligations incurred.

Prospective school-bond purchasers will examine closely the record of authorizations leading up to a bond sale. Attorneys should from the outset prepare the notices of meetings, the form of resolutions, advertisements, ballots, and the information as to who is eligible to vote. They should advise the school board not only on procedures leading up to the election but also on tallying the vote and making the election a matter of record. The laws of the several states differ in their procedures. For example, the following legal forms are prescribed in New York State for the call of special district meetings:[3]

[3] *School Building Projects—A Guide to Administrative Procedures*, State Education Department, University of the State of New York, Albany, N.Y., 1954, pp. 24–25.

To designate and purchase site

NOTICE OF SPECIAL DISTRICT MEETING

The undersigned (*trustee, board of trustees,* or *board of education*) of ______________ school district no. _________ town of ____________________ county of ______________, hereby gives notice that a special meeting of said district will be held at the schoolhouse of said district on the ________ day of ____________ 19___ at _________ o'clock p.m. Eastern Standard (or Daylight) Time for the purpose of voting upon the following question:

Shall the district designate as a ______________________ the following
[New site, or addition to present site]
described piece or parcel of land, to wit: ____________________________
[Give accurate description of
lands to be acquired by metes and bounds]

and authorize the trustee(s) to spend for the acquisition of such site, by purchase or condemnation, an amount not to exceed $___________, and to issue therefor obligations of the district pursuant to the provisions of the Education Law and the Local Finance Law, and to levy a tax to be collected in installments for the payment of the principal of and the interest on such obligations.

Dated _______________________ *19*___

____
[Signed by sole trustee, member of board of trustees, or board of education]

____
Clerk

To authorize funds for erection of building

NOTICE OF SPECIAL DISTRICT MEETING

The undersigned (*trustee, board of trustees,* or *board of education*) of ______________ school district no. _________ town of ____________________ county of ______________, hereby gives notice that a special meeting of said district will be held at ____________________________ on the _________ day of ____________________ 19___ at ____________________ o'clock p.m. Eastern Standard (or Daylight) Time for the purpose of voting upon the following resolution:

Resolved, That the district authorize the erection of a new school building at a cost not exceeding the sum of ______________ dollars ($___________) and authorize the (*trustees, board of trustees or board of education*) to issue therefor obligations of the district pursuant to the provisions of the Education Law and the Local Finance Law, and to levy a tax to be collected in installments for the payment of the principal of and the interest on such obligations.

Dated _______________________ *19*___

____
[Signed by sole trustee, members of board of trustees or board of education]

Every procedure and every step leading to a bond sale must be strictly in conformity with law. The standing of the bond attorney helps to assure that prospective bond buyers will accept the information supplied and enter the best possible bids. The bond attorney will require from the school authorities the following authentic documents: (1) statement of assessed valuation, (2) statement of debt, (3) minutes of board meeting to authorize borrowing, (4) legal citation of borrowing authority, (5) advertisement of sale, (6) certificate of publication of sale notice, (7) certificate of sale and award, (8) resolution confirming sale, and (9) certificate of signatures on bonds. And where an election to approve the bond issue is required by law, the bond attorney will need (1) the resolution authorizing the election, (2) notice of election, (3) certificate of publication of such notice, (4) form of ballot, (5) proceedings on canvassing election returns, and (6) certificate by public official that election returns are a certified public record.

The letter of the law must be followed in calling and conducting an election and in the form of proposal stated on the ballot. The legal service entailed in a bond election is that necessary accurately to determine the authority to issue bonds. A broad type of authorization will assign to the school authorities executive responsibility for scheduling bonds and choosing the most opportune time to take action. The following resolution illustrates clear authorization:

> Shall the Board of Education of ____________ Independent School District, for the purpose of obtaining funds for the purchase of grounds for public schools in said District, and for constructing, remodeling, equipping and repairing public school buildings in said District, none of which school buildings are to be constructed of wood, be authorized to issue bonds of said School District in the amount of Twenty Million ($20,000,000) Dollars, to be payable serially in annual installments as follows:
>
> | | |
> |---|---|
> | $667,000 | 1954 to 1973, inclusive |
> | $666,000 | 1974 to 1983, inclusive |
>
> Said bonds to bear interest at a rate to be not in excess of four per cent (4%) per annum, the interest to be payable semi-annually, and further to annually levy, assess and collect a tax of twenty cents (20¢) (or so much thereof as may be necessary) on each One Hundred ($100.00) Dollars valuation of the taxable property within said Independent School District, to be used to pay the interest on said bonds and the serial installments of principal thereof as each shall respectively mature; provided that the maintenance tax and the bond tax, together, for any one year shall never exceed the rate prescribed by law.

Following clarification of the authority to borrow, the procedures taken in chronological order by the school district with advice of the bond attorney are these: (1) planning a maturity schedule; (2) planning the type, denomination, payment dates, place, and agent, and call provisions

of the debt instrument; (3) preparing an official bid form; (4) advertisement, prospectus, credit rating, basis for bidding, bid deposit leading to award of sale; (5) following the sale of bonds, preparation of bonds, registration, signing, and delivery of bonds sold, and (6) safeguarding receipts of the bond sale.

SUMMARY

Legal counsel is essential in the business management of a school-building program. Major responsibility for advising the school board on its actions, handling of special transactions, and protecting its interests rests with the local school attorney. However, in difficult or special situations he may require the services of other attorneys. In the event of a bond election or sale the services of a qualified bond attorney are usually required.

The school attorney has various responsibilities for contracts, property transactions, finance, liability, and boundary adjustments. He should advise on state and local laws and intergovernmental relationships. He may represent the school district in property negotiations. He should advise on contracts and resolutions.

Generally the bond attorney will review all resolutions and procedures related to bond authorizations. He may guide the school board in its procedures for marketing bonds. The primary concern is to have properly planned maturity schedules, correctly drawn legal and financial instruments, the lowest possiblo interest rates, and safeguarded deposit. Thus it appears that the bond attomey performs a specialized function, whereas the school attomey has a continuing responsibility throughout the course of the project, including final occupancy and settlement of obligations.

DISCUSSION PROBLEMS

1. Investigate and report the procedure by which school-district bonds are certified in the state with which you are concerned.
2. In your school district what legal steps or approvals are required in order to erect a building on the school site?
3. What penalties should be incorporated in contracts for school construction?
4. What is the legal responsibility of a building contractor (for example, with respect to completion date, bodily injury at the site of the job, damage to existing facilities, and workmanship)?
5. Explain the necessity of complete and legally accurate documentation of the authorization of school-bond issues.
6. What legal procedures must be observed in your state to call a bond election, and what governmental units are involved?
7. What precautions should the school board take to ensure competitive bidding in a school-bond sale?
8. What steps have been taken by the states to ensure adequate borrowing

power of local school districts? What can a community do to improve its credit rating and borrowing ability?

9. What preparation and reports should be expected of the school attorney in the course of a school-building program?

10. Illustrate instances where the attorney may be authorized to enter negotiations on behalf of the school board.

11. Describe the legal process in your state for school-district consolidation or annexation.

RELATED READINGS

Brind, C. A.: "Employment of Legal Counsel by School Districts," *American School Board Journal,* 91:27 ff., December, 1935.

Garber, Lee O.: "Hiring an Attorney for the School Board," *Nation's Schools,* 60:59, July, 1957.

———: "Legal Points in Letting Building Contracts," *Nation's Schools,* 53:53–54, March, 1954.

Hamilton, Robert R.: "Some Elements of Legal School Board Procedure," *The Bi-weekly School Law Letter,* vol. III, no. 13, College of Law, University of Wyoming, Laramie, Wyo., August, 1953.

——— and Paul R. Mort: *The Law and Public Education,* The Foundation Press, Inc., Chicago, 1941.

Kelly, G. K.: "Legal Costs in Issuing Bonds," *American School Board Journal,* 122:22 ff., January, 1951.

Kratovil, Robert: *Real Estate Law,* Prentice-Hall, Inc., Englewood Cliffs, N.J., 1946.

McLure, William P.: "Regulation of Credit to Boards of Education," *Review of Educational Research,* National Education Association, 17:163–166, April, 1947.

New York State Education Department: *School Building Projects: A Guide to Administrative Procedures,* Albany, N.Y., 1950.

Punke, Harold H.: *The Courts and Public School Property,* University of Chicago Press, Chicago, 1936.

Remmlein, Madeline K.: *School Law,* McGraw-Hill Book Company, Inc., New York, 1950.

———: *The Law of Local Public School Administration,* McGraw-Hill Book Company, Inc., New York, 1953.

Spencer, William H.: *Casebook of Law and Business,* McGraw-Hill Book Company, Inc., New York, 1939.

CHAPTER 14

The Capital Budget

Practically every step involved in advancing a school-building project depends upon having funds available—the employment of specialist personnel, studies, planning, site acquisition and development, construction, furnishings, and equipment. Since a local unit of government has to conserve its resources for daily operations, for financing past capital outlays, for meeting future needs, and for obtaining the most with its available resources for a given project, a budget for capital outlays is the basis of sound planning and finance. The amount of money involved in providing a single school building in a small school system may exceed the annual operating budget. In a larger school system with many projects under way at any one time, many millions of dollars will be spent. The budget for capital improvements should be prepared with at least the same thoroughness as the annual budget.

School-building construction cannot be budgeted without consideration of long-range program and financial plans. Local borrowing and taxation by school districts affect other local units of government depending upon the same local tax sources and vice-versa. State-imposed debt and tax limits and the taxing powers delegated to school districts and other local units of government determine to a large extent what localities can do in financing school buildings. Federal and state taxes imposed upon local residents greatly affect the willingness of taxpayers to pay local taxes. Hence, fiscal considerations in planning school buildings inevitably bring school districts into relationships with other governmental units.

PROBLEMS OF CAPITAL-BUDGET MAKING

The problems of capital-budget making will vary in many states and local units according to their legal and financial provisions. Legal prob-

lems are discussed in the preceding chapter; revenue problems in the next. This chapter will deal with the problems of preparing the budget, estimating costs, establishing the necessary accounts, and safeguarding funds.

The cost problems in capital-budget making are different from those encountered in current operations. For the latter, accounting procedures have been refined, and the costs do not have to be projected much more than a year. In the case of capital outlays the cost problems may extend into the distant future. The cost of land in a particular location may depend upon certain unique factors. Cost accounting for capital outlays does not always provide a reliable base for projection. Many factors not measured by index numbers affect the bids received from contractors for construction.

These cost problems combined with the problems of financing capital improvements make budget preparation very different from annual-budget making. Yet, the budget for capital outlays generally is treated as a phase of regular budgeting. As a result the much more difficult task of capital-budget making is not as far advanced as it should be. It has been one of the most neglected phases of school administration.

The improvement of capital-budget preparation is closely related to accounting. Without a satisfactory accounting system it is not possible to obtain the kind of cost data necessary for better budgets. Accounts also are essential for control of the capital budget and for making reports of stewardship. These problems will be analyzed in the succeeding sections.

PREPARATION OF THE BUDGET

The capital budget, like the operating budget, consist of three parts: program, costs, and finance plans. Some specialists advocate a long-range capital budget in which the long-range school-building program is translated into costs and the long-range financial plan developed. Others limit the capital budget to the projects actually authorized at any given time.

Long-range capital budgets, if used, have to be modified every year in large systems with a continuous school-building program, and before each new project in smaller systems. The reasons for this are uncertainties in all three phases of the budget. Long-range plans have to be generalized and modified in terms of new developments and what happens to the projections upon which they are based. The projection of site costs and construction costs into the future is guesswork at best. The fiscal capacity of the local school unit, laws relative to taxing and borrowing powers, the impact of the operating budget upon the local

tax base, the burden of other local government upon this base, and other fiscal facts will change from year to year.

Where a locality is able to proceed with its highest-priority projects in order of priority, the long-range capital budget is not too important in administration. As long as the capital budget does not place burdens upon the current budget for operation, maintenance, and other costs inherent in plant expansion, or restrict tax leeway for maintaining and improving the quality of the schools, the school unit can operate upon the basis of project budgets. However, when it is necessary to postpone high-priority projects while proceeding with projects of lower priority, then a long-range budget becomes most essential. Without such planning the community may be limiting its financial ability to proceed with its highest-priority projects at the earliest possible time.

Either an annual capital budget in a large school system or a project budget in a smaller school system would lend itself to more exact planning. Specific projects to be undertaken (program) can be reduced to specifications. Although always subject to uncertainty until bids are actually received, the total costs can be estimated within a narrow margin and financial planning done with reasonable confidence.

Program. The project or the projects to be undertaken have to be considerably advanced beyond the general-scope stage toward the stage of final specifications and working drawings to derive exact cost estimates for purposes of budget preparation. It is seldom possible to wait until this last stage before making the capital budget. Hence, the cost side of the capital budget is subject to errors in estimation. Since it is not always possible to obtain increased revenues later, the result may be that the scope of the project has to be reduced to fit available revenues.

The best procedure in formulating a capital-project budget is to establish in advance priorities for the various parts of the project or projects. If the budget estimates prove to be adequate, then the whole project can be completed. On the other hand, if the estimates prove to be too low, the lowest-priority items can be eliminated and the plans for the project kept intact. Thus the postponed facilities can be added later because the plans anticipated their addition.

Where available resources are insufficient to carry out the program or the project, it is a mistake to begin by cutting facilities, even those which are not of high priority. It is true that educational specifications largely determine the costs, but design, architectural style, working drawings, and particularly specifications are also major factors of cost. If economies can be achieved in the latter, there will be more funds made available for educational purposes. This aspect of economy is treated in Chapter 18.

Another way of balancing the capital budget without curtailing es-

Table 14-1. Capital-improvement-fund Expenditures

Administrative costs–professional services	
1. Architect's services and blueprints (bldg.)	$______
2. Engineer's services and blueprints (bldg.)	______
3. Clerk-of-works (bldg.)	______
4. Legal services	______
5. Board expenses—advertising, elections	______
6. Insurance (if extra)	______
7. Other	______
Total administrative costs	$______
Contract and noncontract costs of school-plant construction	
8. Foundation contract (if separate contract)	$______
9. General-construction contract	______
10. Heating and ventilation contract	______
11. Plumbing contract	______
12. Electrical contract	______
13. Sewage-disposal-system contract	______
14. Other	______
Total of major contracts	$______
15. Noncontract construction	$______
16. Service connections	______
17. Temporary heat during construction	______
18. Other building equipment	______
Total of noncontract costs	$______
Building project costs	$______

sential space or facilities is in the matter of finance. Some methods of finance are more costly than others. The cost of borrowing can be reduced by good administration. Potential economies in the finance side of the budget will be discussed in the next chapter.

Inclusive Estimate of Capital-outlay Expenditure. General rules for school-budget preparation apply to a capital-project budget, the criteria being a defensible program, prepared by a professionally trained educational administrator, adequate in scope and inclusiveness, based upon efficient and economical management, detailed work programs for each undertaking, deliberative adoption by a legislative body, continuous publicity, and clear authority and responsibility. Of these characteristics the factor that gives considerable difficulty in budgeting the capital-improvement fund is the criterion of inclusiveness.

There are several reasons for lack of inclusiveness. The least defensible reason is lack of foresight to note and estimate all the concommitant costs of the project. At best there will be change orders and supplementary contracts, but allowance for these should have been anticipated. Where a part of the costs are paid from current revenues, or reserve funds, or transferred funds, or endowments, or grants-in-aid, there often is an inclination to omit from the project budget some expenditures from

Table 14-1. Capital-improvement-fund Expenditures (continued)

Furniture and equipment costs of new plant	$______
19. Instructional equipment and furniture	______
20. Noninstructional equipment (office and janitor)	______
21. Architect's services (if extra for this)	______
22. Board expenses for equipment	______
Total of new furniture and equipment costs	$______
Site and site-development costs	$______
23. Purchase of site	______
24. Legal services (title search, etc.)	______
25. Architect's services (site plans)	______
26. Survey and engineer services	______
27. Demolition of buildings	______
28. Rough grading	______
29. Finish grading and planting	______
30. Landscaping	______
31. Walks, roads, and parking areas	______
32. Fences, retaining walls, bridges, flag pole	______
33. New water-supply system	______
34. Ornamental lights and flood lights	______
35. Athletic field, play areas, drainage	______
36. Playground and recreational equipment	______
Total of site and development costs	$______
Total of school-plant costs	$______
Debt-service costs	$______
37. Interest during construction	______
38. Bond retirement	______
Total of debt-service costs	$______
Total capital-improvement-fund expenditures	$______

these sources. Such practical expedients do not give a true picture of the cost of the project and encourage careless budgeting that is likely to result in overlooking some major eventuality.

The school district may have assets that reduce the project cost. The district may already possess the land; the preliminary-planning costs may have already been met; or services like a central heating plant or utilities may be available on the site, especially in the case of additions to existing plant. Such assets certainly affect the cost analysis of building projects. They can only be estimated in relation to a total project budget.

In consideration of the difficulty of preparing a comprehensive budget of building-project expenditure, the above classification of expenditures is proposed.[1] This classification will enable the school board to maintain a close budget control on capital-improvement-fund expenditures.

As the plant-construction project progresses, the clerk of the board

[1] Adapted from a plan worked out by the Bureau of Field Services, New York State Education Department.

should correct the project budget for change orders approved by the school board.

Building equipment that may not be contained in major contracts includes stage curtains, draperies, mechanical ash hoists, electric light bulbs, program system and clocks, fire hose and standpipes, incinerators, lockers, room-door numbers, swimming-pool filtration, shades, exhaust systems, soap dispensers, radio equipment, vault doors, removable stage lights, metal window guards, shelving, cabinets, ventilators, bulletin boards, rugs, air-conditioning equipment, screens, weather stripping—depending upon the completeness of the plans and specification.

Revenue Plan. The sources for and methods of financing capital outlays will be discussed in the next chapter. This section will deal only with the items to be included in the revenue plan for the project budget. The following headings would serve for the revenue side of a capital-project budget or for the bookkeeping account of school-plant-project receipts.[2]

Table 14-2. Capital-improvement-fund receipts

1. Balance on hand (Date)	$______
Revenue	
2. Grants from state or Federal government	______
3 Other grants-in-aid	______
4. Premium on bonds	______
5. Interest on deposit of capital fund	______
6. Accrued interest from sale of bonds	______
7. Transfer from current revenue	______
8. Transfer from special funds	______
9. Other sources	______
Nonrevenue	
10 Sale of bonds	______
11. Sale of bond notes	______
12. Insurance adjustments for losses	______
13. Sale of real property	______
14. Sale of equipment	______
Total capital-improvement-fund receipts	$______

Revenue for school-plant construction may be accounted either as receipts for a capital-improvement fund or as current revenue for capital outlay. Payments on bonds and interest due are classified as debt service in the regular budget. Aside from advantages in cost accounting the capital expenditure, it is sound practice to keep the nonrevenue receipts from the sale of bonds in a separate clearing account such as a capital-improvement fund. This avoids "double accounting" such revenues in the current operating budget, once as capital outlay and again as repayment of bonds under debt service.

[2] Refer also to *Financial Accounting for Local and State School Systems*, Handbook 11, U.S. Office of Education, Washington, 1957.

SCHOOL-BUILDING COSTS

In order to arrive at some basis for comparing the cost of one building plan or method of construction with another and for estimating a capital budget, the project cost needs to be divided by an acceptable unit of measure. Technically, such computed unit costs will depend for their validity upon the comparability of numerator and denominator, the size of the project, the inclusiveness of accounting for costs, and the influence of a number of incidental local factors that may not be immediately obvious, such as climatic conditions, subsoil factors, availibility of materials and labor, competition among contractors, and the quality and scope of the facilities included. The choice as to type of cost unit must be made in terms of its probable reliability and the purpose of the comparison or use to be made. Among the commonly published construction-cost measurements are cost per cubic foot, cost per square foot, cost per weighted pupil station, and cost per pupil capacity.

Cost per cubic foot is a standard engineering measurement taking into account the height of structure, but it fails to indicate whether interior spaces are adequate or efficiently distributed or indeed usable at all. Such excess space as empty attics, oversized foyers, exceptional corridor width, and large basements will not infrequently reduce the apparent cost per cubic foot. Conversely, an efficiently designed layout of all building spaces yielding maximum utility and a well-organized, compact building plan may in effect increase the computed cost per cubic foot, even though they lessen the total plant cost for the functions and service load specified.

The wide differences to be found among school-building plans in respect to the proportion that usable instructional space holds to total area have in recent years led to popular acceptance among educators of cost per square foot of usable space as a cost-comparison statistic. It may be said that today we can build better schools for less money than we could two decades ago. A cost comparison of the traditional, multistory, compact, minimum perimeter, masonry building with a modern one-story, ground-slab, curtain-wall, fire-resistant school building will often show the latter to produce lower cost per square foot, besides having some educational advantages. Furthermore, the low-cost school built with new construction methods promises to have equal longevity with the more expensive plan type and at the same time to require less maintenance expenditure.

Temporary school buildings so-called are seldom economical in the long run. If they are to afford equivalent educational facilities, their initial cost per square foot will be almost as high as that of low-cost

permanent construction. They may entail higher cost for upkeep, operation, and insurance. The only possible economy of temporary construction occurs where there is virtual certainty that a given child population will decrease or move away from the neighborhood within a short time. In most instances it would assure larger value for the money spent to build permanently. It is often good planning, however, to construct schools that can be easily converted from elementary grade to secondary grade use or to some other use.

For some purposes the cost per pupil capacity is a valid statistic. A study of eighty-five rural consolidated schools[3] housing all twelve grades showed clearly that smaller school plants of less than about seven hundred enrollment cost progressively more per pupil. In this instance the problem was to develop an equitable formula for apportioning state aid for school building. It was found that when the same sparsity weighting was applied to the number of pupil units as was used for determining the number of teacher stations for state-aid purposes, the cost per weighted pupil capacity of the building followed n consistent average trend. In other words, the small schools cost more per pupil in about the same ratio as they cost more per teacher for an equivalent educational program. This finding follows the statistical truism that seldom is there a linear measure between cost and number of units. Of course, this fact may indicate inefficiency of district organization, unless the sparsity of population is so great as to preclude a larger building or local unit.

The tendency to manipulate cost-comparison ratios casts a degree of doubt or at least uncertainty on all published figures. With cost-per-square-foot calculations, for example, the square footage of open exterior passageways is arbitrarily halved. Pupil-capacity estimates, on the other hand, are primarily a function of purported use. This dilemma has led several authorities to advocate usage of cost per pupil station or cost per weighted station as the more stable unit of comparison.

Cost units expressed in dollars are not comparable until corrected at least for regional differentials and cost trends. The F. W. Dodge Corporation Building Cost Index, prepared by E. H. Boech and Associates, Cincinnati, and published in *Architectural Record*, is widely accepted by architects as a means of translating project costs to a common base year or adjusting costs to current economic levels.[4] The Dodge Index is applicable to schools, apartment buildings, hospitals, and other brick and concrete structures. The industrial commissioners of some states publish an index of building cost based upon the wholesale price of building materials

[3] W. H. Strevell, *State Aid for Central School Building*, Bureau of Publications, Teachers College, Columbia University, New York, 1949.

[4] A critical discussion of the several construction-cost indexes appears in *Engineering News-Record*, April 23, 1942.

and union hourly wage rates in the building trades compiled by the U.S. Department of Labor. Roy Wenzlick and Company, St. Louis, publishes in *The Real Estate Trends* an index known as the cost of building a standard six-room frame house. The appropriate index must be chosen for the type of construction and region. Clark's Index of school-building prices, published regularly in *School Executive*, is a handy reference for school administrators who want to compare the cost per unit, such as square foot of several buildings constructed during different economic periods. A person interested in economic forces affecting building costs may refer to *The Economic Almanac*, published by National Industrial Conference Board, New York.

The differences in cost of construction are commonly a result of such variables as quality and methods of construction, regional differentials, differences in accounting, and price trends. Local conditions can cause huge variations, as, for example, the manner of drawing plans and specifications and advertising for bids, the conditions attached to contracts, the willingness of responsible contractors to compete, and the available labor for the skills required in a particular construction method. These undependable factors are reason for caution in accepting any cost figures on individual projects either as typical or as applicable to the immediate problem being studied.

COST ESTIMATION

Cost per cubic content of a building, defined as actual cubic space enclosed within the outer surfaces of the outside or enclosing walls and contained between the outer surfaces of the roof and 6 inches below the finished surfaces of the lowest floors, is generally considered by architects to be as accurate as any method of estimating the cost of new construction. The prevailing trend in cubage cost must be adjusted for location of the project, type and classification of construction, and various supplementary factors and information.

The architect faces a serious task in preparing an estimate of costs because the school district will choose its course according to his estimates. He has to exercise intellectual honesty, but nevertheless he should be excused some probable error. Even the bidders themselves on the basis of complete plans and specifications may differ as much as 30 per cent or more. Where a more exact estimation of cost than can result from the architect's method is desired, the owner may employ, or authorize the architect to employ for him, trained estimators working with all available information. The chief value of estimates is in the initial-planning stages where the school staff and architect, or contractor in the case of minor modernization work, seek to achieve an economical and

effective solution to the problem presented. Plans are developed by intelligent and informed judgment. The cost estimates of various hypothetical alternatives must be settled in the main by subjective judgment during the synthesis of planning.

Where alternates are written in the final plans and specifications, the bidder is invited to place a price on them in his proposal. Such cost estimates are accurately tabulated; and then the school board must choose its ultimate method of construction. An evaluation, however, of plans and specifications is entirely possible prior to the inviting of bids. In small school districts a friendly contractor or estimator could assist the school board to determine the probable cost of modernizing old buildings. Such work may be done on a wage and material basis.

Where an executive architect has been retained to advise on major new-construction projects, the quality and amount of space to be designed is often derived from an estimate of cost. Fortunately a way can be found in many instances to reduce cubage costs without sacrificing usable space. These cost-saving efforts should not be permitted to result in cheapening the equipment and facilities below acceptable institutional standards.

Architects frequently are compelled to speculate on future projects. They are asked to submit proposals involving cost estimates before the requirements are completely studied. This can lead later to serious disappointment when it is discovered that desired features have to be eliminated from the plans. It is better practice to engage a reliable architect at the preliminary-survey stage so that he can study the problem and develop a minimum solution before making cost estimates.

Rather exact estimates of the cost of a reasonable solution proposed for the school system's needs and its building problems have to be reached before the school board can seek legal authorization to expend any amount of money for capital improvement. This necessitates profound study and planning of solutions—even the preparation of preliminary sketches and the making of decisions on outline specifications. It would not be in the public interest to choose some arbitrary figure without such study and then employ an architect to build for so much money. These practical considerations have led school authorities to make comparative studies of the costs of construction per square foot, per pupil station, or per weighted pupil station.

The initial expenditure for school plant is an adequate measure of total project cost only if one may infer a normal effective burden on current expenditures in the annual budget thereafter. According to this thesis it should be possible to establish within limits an average minimum economic quality of design and construction at some figure such as $8 to $12 per square foot in 1950. The amount and kind of spaces so

constructed would vary with the scope of educational activities that the community seeks to supply.

Records of Estimates and Proposals. Proposals and representations of all kinds are important factors in capital-budget making and in considering bids. An architectural firm furnishes a description of its office; a school-supply house advertises the specifications and performance of its products; a building-materials company offers certain guarantees; a contractor proposes not to substitute any item below the standard of that specified.

Among the individuals who furnish estimates are school-building consultants, real estate agencies, suppliers of school furniture and equipment, architects, engineers, practicing contractors, inspectors, and experienced estimators. When estimates and proposals are reduced to writing or even kept in rough notes based on informal discussions, they should be preserved and filed for ready reference for the duration of a school-building program, which may extend over a period of months or years.

Implications of Total Project-cost Estimates. The largest cost items in a school-building project are four major contracts: the general contract, plumbing contract, heating and ventilating contract, and electrical contract. To these may be added a standard 6 per cent architect's fee. The full picture of total project costs must cover at least the items enumerated in Table 14-3, which records the average proportionate expenditure by item of 100 rural consolidated-school projects that were for the most part designed to rehouse the whole school-age population of the district. In this study technical services averaged 6.9 per cent of total contracts (5.4 per cent of total project costs); clerk-of-the-works, 1.0 per cent of total contracts (0.8 per cent of total project costs); legal services, 0.6 per cent of total contracts (0.5 per cent of total project costs); board expenses, 0.6 per cent of total contracts (0.5 per cent of total project costs). The sum of administration, site, and furniture and equipment amounted to 27.1 per cent of total contracts (21.3 per cent of total project costs).

Obviously all figures on expenditure have to be analyzed in order to arrive at any uniform principle or definition of total project costs; the bid price may not be the actual amount of final payment on contracts because of change orders, penalties, alternates, and special provisions in the contract. Oftentimes all or part of the furniture and equipment will already be on hand. The school may already possess its site. The site may or may not be fully developed. In the study illustrated in Table 14-3 the cost of site purchase was consistently low because of the rural location of the projects.[5]

[5] Study by Division of School Buildings and Grounds, New York State Education Department, 1945.

effective solution to the problem presented. Plans are developed by intelligent and informed judgment. The cost estimates of various hypothetical alternatives must be settled in the main by subjective judgment during the synthesis of planning.

Where alternates are written in the final plans and specifications, the bidder is invited to place a price on them in his proposal. Such cost estimates are accurately tabulated; and then the school board must choose its ultimate method of construction. An evaluation, however, of plans and specifications is entirely possible prior to the inviting of bids. In small school districts a friendly contractor or estimator could assist the school board to determine the probable cost of modernizing old buildings. Such work may be done on a wage and material basis.

Where an executive architect has been retained to advise on major new-construction projects, the quality and amount of space to be designed is often derived from an estimate of cost. Fortunately a way can be found in many instances to reduce cubage costs without sacrificing usable space. These cost-saving efforts should not be permitted to result in cheapening the equipment and facilities below acceptable institutional standards.

Architects frequently are compelled to speculate on future projects. They are asked to submit proposals involving cost estimates before the requirements are completely studied. This can lead later to serious disappointment when it is discovered that desired features have to be eliminated from the plans. It is better practice to engage a reliable architect at the preliminary-survey stage so that he can study the problem and develop a minimum solution before making cost estimates.

Rather exact estimates of the cost of a reasonable solution proposed for the school system's needs and its building problems have to be reached before the school board can seek legal authorization to expend any amount of money for capital improvement. This necessitates profound study and planning of solutions—even the preparation of preliminary sketches and the making of decisions on outline specifications. It would not be in the public interest to choose some arbitrary figure without such study and then employ an architect to build for so much money. These practical considerations have led school authorities to make comparative studies of the costs of construction per square foot, per pupil station, or per weighted pupil station.

The initial expenditure for school plant is an adequate measure of total project cost only if one may infer a normal effective burden on current expenditures in the annual budget thereafter. According to this thesis it should be possible to establish within limits an average minimum economic quality of design and construction at some figure such as \$8 to \$12 per square foot in 1950. The amount and kind of spaces so

Total school-project cost may properly be termed the initial investment. Several pertinent questions remain to be answered over a period of years. Assuming a fifty year useful life of the building, is the expense of repair, replacement, and general upkeep less than normal depreciation? Is the building practical and economical to operate with respect to custodial service, heating, ventilation, sanitation, safety, insurance rates, and supervision? Does the building provide adequate space and facilities necessary for efficient use of teacher staff, good educational results, and general community satisfaction?

If these questions can be answered in the affirmative, the total project costs have a bona fide value rendered. But if excessive maintenance and operation expense develops, or the school plant falls short of expectations as to educational efficiency, the total project-cost figure has an implied penalty making it misleading and false for quotation on a cost-comparison basis.

ACCOUNTING FOR CAPITAL FUNDS

The accounting, safeguarding, and reporting of all school-building revenue derived from sale of bonds, bond anticipatory notes, state grants-in-aid, Federal grants, endowment funds, earmarked local building-fund taxes, and lawfully authorized building-reserve funds will have to conform in procedure with governing statutes and regulations of the respective state, county, or municipality. Therefore a complete ledger account of such capital funds ordinarily is kept as a supplemental schedule to the general accounts of the school district (Figure 14-1). Competent persons should be assigned to keep the building-project account. In smaller districts a skilled clerk-of-the-works may temporarily advise the regular school-district clerk in this duty. Larger cities have trained personnel to keep such accounts in the business office. Frequently the payment of full costs from these funds on both contract and noncontract items will be delayed for a period of time.

Simplification of Accounts. The chief accounting officer of the school district needs a flexible accounting system to handle small and very large construction projects under the capital-project fund. The school board is confronted with the necessity of holding special meetings on short notice during the progress of large construction undertakings; and they will demand prompt control information as to exact payments made to date and balance due to be paid on individual contracts presently in force.

The proceeds of a bond issue may have to be deposited in more than one bank account in order to spread the risk on insured deposits, and therefore a separate control register may need to be set up for each

Payments for equipment, site development, and the like can extend over several years. Properly speaking, full extent of capital outlay, including equipment, furnishings, and fittings for library, cafeteria, science laboratories, shops, gymnasiums, auditoriums, bus garage, and standard classrooms; the playground facilities, the driveways, the parking spaces, and the stadiums, floodlights, and athletic fields; the extra clerical expenses like advertising, meetings, and elections, taken altogether belongs in the total cost of the project.

Table 14-3. Percentage Distribution of Construction-budget Cost Items in 100 Central School-plant Projects

Construction budget items	Median of 100 projects: Ratio to building costs		Ratio to total school-plant cost	
General construction	74.0		58.7	
Heating and ventilation	12.0		9.4	
Plumbing	4.7		3.7	
Electrical	5.3		4.2	
Other	3.4		2.7	
Building cost		100.0		78.7
Technical services	6.9		5.4	
Clerk-of-the-works	1.0		0.8	
Legal services	0.6		0.5	
Board expenses	0.6		0.5	
Administration cost		9.1		7.2
Site purchase	2.8		2.2	
Site development	6.0		4.7	
Site cost		8.8		6.9
Furniture and equipment cost		9.2		7.2
Total school-plant cost		127.1		100.0

To reduce the unit cost one might disallow all or part of these cost items that parallel the four or five major contracts. But a district is well advised to pay all initial costs and fully equip its new buildings, as well as to develop and landscape its playfields and grounds, where possible out of the original bond issue. Skimping on instructional materials over a protracted period of years in order to complete a physical plant is indeed poor economy and bad planning.

Unless land values are very high, one should on the average allow about twenty-five per cent above the sum of the construction contracts in order to arrive at an estimate of total school-plant-project costs.

separate account. Each authorization voted by the school-district electors usually will be required by law to be kept in a separate capital fund. Large districts and cities that have a more or less continuous school-building program will wish to keep a clear account of the cost of each project segregated to the site, although revenues for such projects may be derived from more than one separate capital fund.

A generalized solution for flexible accounting of capital funds is suggested in the capital-fund-budget classification system outlined above. A separate expense ledger may thus be set up to take care of each item of the classification; for example, "school board expenses" could be broken down into printing, advertising, travel expenses, extra clerical expenses, and so on. The budget classification system lends itself to budget control over all cost items of the project during progress of the work. It contributes to subsequent ease of cost analysis and of preparing official reports for state agencies and the school board.

Budget Control. The items of the capital fund are encumbered whenever authorizations are issued or contracts are let, and the amount of encumbrance is revised whenever change orders prepared by the architect are added to the contract agreement. The segregated accounts should show unexpended and unencumbered balances as payments are made. A supplemental budget-control report is therefore necessary to show the status of school-bond funds.

Where lump-sum contracts are let on the basis of formal bids, it is fairly easy to encumber the building-fund account. As payments are made on certification of the architect under terms of the contract, they reduced the encumbrance without affecting the unencumbered balance. Where payments are made on the same school-plant project or perhaps the same contract from separate funds like the bond-money account and the current general-budget account, the accounting officer can set up for each fund additional capital-outlay ledger schedules with parallel headings, thus keeping the funds separate, but enabling the accounting officer to summarize the accounts for certain special reports and for analysis of the plant-project costs as a whole.

Fixed-asset Accounting. Assuming the plant improvements are totally obsolescent in fifty years, it would seem consistent to set up a depreciation reserve. However, school districts generally use the rehousing-cycle approach, and in practice the costs of renovating or replacing fixed assets are charged to the fund from which the money is derived. Renovation and modernization of existing school plant often proceed under minor contracts that are executed without formal bids and often without architect's specifications. Minor contracts may be offered on a lump-sum or a cost-plus basis. It is true that expenditures of a capital nature for such minor contracts will very likely be paid from current revenues. But

Fig. 14-1. Ledger accounting of capital-fund expenditures. (*Adapted from forms suggested by New York State Education Department.*)

Construction Account				Cost of Site and Improvement of Grounds										
		Order check		Site		Improvement of grounds								
Architect's certificate (if any)	To whom issued	No.	Date	New land	Service costs	Service costs	Grading and planting	Roads and walks	Walls and fences	Athletic fields and play-grounds	Water supply	Outside service con-nections		

Construction Account				New Buildings										
		Order check		Control costs				Construction costs						
Architect's certificate (if any)	To whom issued	No.	Date	Legal and insurance service	Bond service	Wages of special secretary and building inspector	Services of architect-engineer	General con-struction contract	Heating and ven-tilating contract	Sanitary and plumbing contract	Electrical contract	Special contracts	Inside service con-nections	

Construction Account				New Equipment										
		Order check		Noninstructional equipment				Instructional equipment						
Architect's certificate (if any)	To whom issued	No	Date	General office equipment	Janitor equipment	Cafeteria equipment	Other equipment	Furniture	Library furniture and equipment	Shop furniture and equipment	Com-mercial equipment	Apparatus used in instruction	Gymnasium apparatus and equipment	Special equipment

SUMMARY

Budgeting the capital-improvement fund is a separate planning and accounting process. While the exact structure of the capital budget must be adapted to local circumstances, it is advisable in all instances that the capital budget present a true, balanced, and complete record of the capital projects. This is usually accomplished by a separate capital-budget schedule.

Lack of inclusiveness in capital-budget making has been a major source of confusion in cost comparisons, long-range financial planning, and burdening of the current operations. Therefore this chapter has undertaken to propose a detailed outline for capital-improvement-fund accounting.

School-building costs are generally represented in terms of a suitable cost unit. The cost per square foot or cost per pupil station are units of measure most popular with educators. However, it must be known what types of facilities are compared, the sizes of the school plants, the cost items included additively, the service value achieved, and the local variables. Published trend data on construction costs have a limited usefulness.

Cost estimation is an essential step in the planning phase of a school-building program or project. This work should be assigned to trained estimators. The school architect will assist in estimation, and he also has the responsibility to plan within such estimates. Cost estimates for a given project or improvement are available in parts. The budget maker has to collect many estimates, including site, furnishings, personnel fees, financial charges, construction costs, and even long-range implications in order to get the true picture for the school system.

An accounting-record system is also essential. This will include at least budget control, records of estimates, bond records, safeguarding funds, and required reports.

DISCUSSION PROBLEMS

1. What steps should the school board take to safeguard school-construction funds? Should expert advice be sought?

2. Outline the factors that determine the credit rating of a school district.

3. How frequently should the school-construction account be audited and published?

4. What laws apply in your state to building-reserve funds? To the transfer of funds between the general account and the construction account?

5. What factors should determine the length of term for which school bonds shall be issued?

6. Discuss the measures taken at both state and Federal levels to regularize the indebtedness of local government and show whether such measures have proved just and adequate.

7. Describe the form and usefulness of the school-bond register. Where may suitable bond ledger books be obtained?

it would seem preferable to post a sum or at least an estimate against depreciation reserve in the capital-controlling accounts.

Bond Records. A bond register is a permanent record of all essential information pertaining to a bond issue of any amount. Bound in one book should be a complete record of principal due and paid, interest due and paid, cancellation of individual bonds and interest coupons, and funds on hand at the paying agent.[6] The bond register gives exact information needed from time to time in paying bonds and coupons, calculating tax levies and other revenue required, and planning the annual school budget.

SAFEGUARDING FUNDS

Several states require special detailed reports on the handling of receipts from the sale of school bonds. New York State, for example, calls for a complete and detailed report of (1) payments from bond moneys and bond-anticipation notes issued in anticipation of the sale of bonds, (2) the debt status annually as basis for apportionment of state building quotas, and (3) details on payments to individual contractors, together with reasons for addition or deduction orders on contracts, for the entire school-plant project. This information is reported to state authorities before allotments of state aid are made and before final state approval of a new building project is issued.

The indebtedness of the district should appear as a separate schedule in the annual school budget and annual financial report. The good faith, confidence, and support of the school-district electorate will in the long run have a profound effect on the district's credit standing.

The various surety bonds, bid bonds, performance bonds, work and materials bonds, and guarantees are in the nature of contractor's services, presented in Chapter 19.

Most states have strict regulations as to the depository of proceeds from sale of school-district bonds, both to safeguard against loss and to prevent misuse. A local unit, nevertheless, has recourse to certain methods of investing bond moneys at interest, until the money is withdrawn for payments to contractors, by effecting a depository agreement and withdrawal calendar with a local bank or banks. As a rule a contract is executed for a trust account with the nearest Federal Reserve Bank, depositing therein an amount of government bonds to equal the school district's deposit. An investment calendar for the capital fund should be planned along with the project-completion schedule.

[6] Satisfactory bound bond registers may be purchased from publishers of school-accounting forms.

SUMMARY

Budgeting the capital-improvement fund is a separate planning and accounting process. While the exact structure of the capital budget must be adapted to local circumstances, it is advisable in all instances that the capital budget present a true, balanced, and complete record of the capital projects. This is usually accomplished by a separate capital-budget schedule.

Lack of inclusiveness in capital-budget making has been a major source of confusion in cost comparisons, long-range financial planning, and burdening of the current operations. Therefore this chapter has undertaken to propose a detailed outline for capital-improvement-fund accounting.

School-building costs are generally represented in terms of a suitable cost unit. The cost per square foot or cost per pupil station are units of measure most popular with educators. However, it must be known what types of facilities are compared, the sizes of the school plants, the cost items included additively, the service value achieved, and the local variables. Published trend data on construction costs have a limited usefulness.

Cost estimation is an essential step in the planning phase of a school-building program or project. This work should be assigned to trained estimators. The school architect will assist in estimation, and he also has the responsibility to plan within such estimates. Cost estimates for a given project or improvement are available in parts. The budget maker has to collect many estimates, including site, furnishings, personnel fees, financial charges, construction costs, and even long-range implications in order to get the true picture for the school system.

An accounting-record system is also essential. This will include at least budget control, records of estimates, bond records, safeguarding funds, and required reports.

DISCUSSION PROBLEMS

1. What steps should the school board take to safeguard school-construction funds? Should expert advice be sought?
2. Outline the factors that determine the credit rating of a school district.
3. How frequently should the school-construction account be audited and published?
4. What laws apply in your state to building-reserve funds? To the transfer of funds between the general account and the construction account?
5. What factors should determine the length of term for which school bonds shall be issued?
6. Discuss the measures taken at both state and Federal levels to regularize the indebtedness of local government and show whether such measures have proved just and adequate.
7. Describe the form and usefulness of the school-bond register. Where may suitable bond ledger books be obtained?

8. Obtain project-cost data and cost-unit information on several recent school buildings in your area. What difficulty did you have in securing the true total cost of each project? Determine the costs per pupil station; how does this compare with costs per pupil capacity?

RELATED READINGS

American Association of School Administrators: *How Much Should a Good School Cost?* (packet including plan for cost comparisons), Washington, 1958.

Armstrong, C. Clair: "Low-cost Construction for Districts with Low Valuations and High Space Requirements," *Nation's Schools,* 52:67–71, September, 1953.

Case, Hiram C.: *Handbook of Instructions for Recording Receipts and Disbursements for School Purposes,* C. F. Williams and Son, Albany, N.Y., 1950.

Clark, H. F.: "School Building Costs and Bond Prices," *School Executive,* continuing series.

Cornell, Francis, G.: "High School Size and Building Costs," *American School Board Journal,* 134:40–42, January, 1957.

Darby, Francis C.: "How to Talk School Building Costs," *School Executive,* 76:58–59, October, 1956.

Engelhardt, N. L., Jr.: "Unleashed Savings in School Construction," *American School Board Journal,* 130:47–49 ff., January, 1955.

Engelhardt, N. L., N. L. Engelhardt, Jr., Stanton Leggett, et al.: *School Planning and Building Handbook,* F. W. Dodge Corporation, New York, 1956.

Fowlkes, John Guy: *Principles and Practices of Financial Accounting for Schools,* E. M. Hale and Company, Eau Claire, Wis., 1934.

Harriman, Alonzo J., and Paul P. Wheeler: "Units of Cost for Comparing School Buildings," *The American School and University,* 27:133–138, 1955.

Indiana and Midwest School Building Planning Conference: "Proceedings: Planning Educationally Sound Buildings at Low Cost," *Bulletin,* School of Education, 29:1–102, November, 1953, Indiana University, Bloomington, Ind.

Jarvis, E. D.: "Goals in Financing School Building Construction," *American School Board Journal,* 116:29 ff., May, 1949.

Kester, Roy B.: *Principles of Accounting,* The Ronald Press Company, New York, 1939.

Linn, Henry H. (ed.): *School Business Administration,* The Ronald Press Company, New York, 1956.

Misner, F. M.: *Extra Costs and Incidental Costs in the Erection of School Buildings,* Bureau of Publications, Teachers College, Columbia University, New York, 1934.

National Society for the Study of Education: *Thirty-third Yearbook: Planning and Construction of School Buildings,* Public School Publishing Company, Bloomington, Ill., 1934.

Pulver, H. E.: *Construction Estimates and Costs*, McGraw-Hill Book Company, Inc., New York, 1947.

Rosenstengel, W. E.: "Budgeting for Schoolhouse Construction," *American School Board Journal*, 108:20, May, 1944.

——— and Jefferson N. Eastmond: *School Finance*, The Ronald Press Company, New York, 1957.

Schmidt, H. W.: "A School Building Cost Study," *American School Board Journal*, 124:51, February, 1952.

School Planning (Data Book), Book Department, *Architectural Record*, New York, 1952.

U.S. Office of Education: *Financial Accounting for Local and State School Systems*, Handbook 11, Washington, 1957.

Wood, Frederic C.: "Myth and Mystery in the Cost of Schools," *Educational Record*, 38:355–359, October, 1957.

CHAPTER 15

Capital-outlay Finance

Capital outlays, with proper care and maintenance, have a long period of probable usefulness. Nevertheless, obsolescence and depreciation will take place gradually over the years. Thus it is appropriate to spread the financing of such outlays over a period of years either by saving for future outlays, paying part of the original cost out of each annual budget, or by debt-service payments on borrowed funds.

In small school systems a long interval of time may elapse between projects. Yet the financial requirements in any year are fixed largely by building costs at the time contracts are let. Furthermore, if funds are borrowed for the purpose, the cost of borrowing (interest rate) is fixed at the time the funds are borrowed. These facts create serious problems of local finance.

A large school system, if it is engaged in a continuous school-building program, is better able to average the ups and downs of the price level and the money market. Where it could intensify its program of modernization and plant replacement during a period of low costs and low interest rates, such a local unit would provide more facilities with its resources. Unfortunately such periods of low economic activity cannot be predicted; all that can be done is to take advantage of the opportunity when it occurs. It is seldom justifiable to continue postponing high-priority projects in anticipation of such an eventuality.

The sound financing of capital outlays depends upon a number of elements: a wise choice among the various methods of finance, the realization of all potential economies in finance, management of prudent borrowing, seeking modifications in unreasonable legal restrictions upon local taxing and borrowing powers for capital purposes, and taking full advantage of all available sources of revenue. These and related matters are discussed in the sections which follow.

METHODS OF FINANCE

Assuming that the local unit has taken full advantage of whatever Federal or state aid is available for capital outlays and for debt service, there are several possible choices in financing the local share of school-plant costs: pay-as-you-go from current revenues, accumulations of reserves or balances (saving), short-term borrowing (notes or bonds with short maturities), long-term borrowing (bonds), or various combinations of these.

Pay-as-you-go. The pay-as-you-go policy is designed to avoid payment of interest by meeting all or part of the cost of capital outlays from annual taxes out of the current budget. Sometimes in order to stabilize property-tax rates it is necessary to plan to meet part of the capital outlays out of current revenues. Among items which can readily be provided by this means are site purchase, various phases of site development, specialist services, furniture, equipment, finishing and decorating certain parts of a facility, modernization projects, and all or part of the cost of the contracts for new construction (especially elementary units, additions, and small special-purpose units).

The pay-as-you-go plan eliminates the cost of borrowing, which on long-term issues could add 50 per cent to the cost of a project. It is sometimes argued as a disadvantage of cash payment that the taxpayer would be able to earn more on his money than the interest rate which the local school unit would have to pay for borrowing. This argument, however, should not be accepted uncritically. Pay-as-you-go is a prudent policy where it stabilizes tax revenues, stimulates local economy, and avoids burdensome debt at high prices. Furthermore a school board which borrows funds for capital outlays to be repaid gradually at some remote time is less likely to demand prudent planning and careful management than it would where taxes must be levied immediately to provide for the outlays.

A major difficulty preventing greater use of the pay-as-you-go plan is the burden of past debts. Large school systems with continuous school-building programs could provide for their facilities at a much lower cost from current taxation. Yet they continue to borrow because they have a large burden of debt service to pay for past borrowing. Unless they move to partial pay-as-you-go, they are unlikely ever to get on a sound financial basis; any extension of Federal or state assistance for school construction should be utilized to get local financing on a current basis in such instances.

Reserve Funds. As a rule the maximum period for which a local unit can borrow is fixed by law. Generally this period is much shorter than the probable usefulness of the facility. Unless a local unit is large enough to have a number of projects, there will be periods of little or no major debt

service alternating with periods of relatively high debt service. This creates instability in local tax rates.

Reserve funds enable a local unit to spread the cost of capital outlays over a longer period of time, reduce the need for borrowing, reduce the cost of interest, and where a number of bond issues are outstanding, make it possible to avoid peaks and valleys in the tax rates for capital purposes. They enable a district to prepare for anticipated needs.

Many states have prohibited the use of reserve funds because of past mismanagement and the same interest-payment-loss argument which was raised against pay-as-you-go. However, in recent years there has been a renewal of public interest in such funds, and an increasing number of states are authorizing them with new safeguards to prevent their diversion for other uses, to protect their investment, and to provide for their supervision by some state agency.

No locality should be allowed to create such a stand-by fund without authorization. Periodic audits by outside auditors and reports should be required.

Borrowing. Borrowing for school construction generally is associated with the issuance of long-term obligations—bonds. Yet interest rates are often lower for short-term obligations—notes or bonds. The total interest cost is certainly much less, even if the interest rates are the same. Short-term borrowing improves the credit status of a locality and makes it possible to carry on more construction where the locality is subject to arbitrary debt limits. Under a given debt limit, a locality issuing five-year obligations can do four times as much building in a twenty-year period as one issuing twenty-year obligations.

Even where it is necessary to issue long-term bonds, it may be advantageous to issue notes in anticipation of the sale of bonds. This can often reduce total interest costs by reducing the length of the bond issue. Borrowing can be limited to what is needed at any given time. This provides more time to determine exactly how large the bond issue needs to be and provides greater flexibility in timing the bond sale.

A long-term bond issue should be limited to what is absolutely necessary to supplement funds from current revenues, reserve funds, and short-term borrowing. Often it should be limited to the shortest maturity schedule possible.

Long-term borrowing is a prudent policy when the long-run outlook is for inflation. It is particularly advantageous during periods of low building costs and low interest rates. However, when long-term debt is created at high prices or high interest rates or both, great caution has to be exercised. Although the long-run outlook may be for sustained inflation, there is no certainty that a large part of the debt may not have to be repaid when money is tight and taxes hard to get. It is for this reason that

maturity schedules often have to be kept at lowest terms fiscally possible.

Another important consideration is the type of obligation to be issued. School systems generally are required to and usually do issue serial bonds. These call for a repayment of part of the principal each year and so reduce interest costs. The schedule of such repayments, within limits, can be geared to the payment schedule of other outstanding indebtedness, to the tax-rate effects of annual debt service, and to future obligations likely to be incurred. These are matters to be carefully studied in fiscal planning.

There are other less commonly used types of school bonds. The straight-term bond provides that the entire principal shall be repaid at some future date. It involves the maximum interest cost and is most advantageous to the lender. If not already prohibited by law, the school administrator should seek to avoid this type of obligation. Unless a sinking fund is created to accumulate the money, the straight-term bond could create extreme problems. It might even be necessary to borrow to repay the principal. In the past such debts have continued long after a project has been depreciated and no longer used.

The sinking-fund type of bond theoretically has the same advantages as the serial bond with greater flexibility. However, the interest collected may be less than the interest paid, and so may be more expensive. The very flexibility which it provides may result in not having the money available to repay the loan when due. Often it requires a separate earmarked tax. The sinking fund itself demands much more of management than does the serial bond. It is not authorized in many states and should be used where authorized with extreme prudence.

The callable bond ordinarily commands a higher rate of interest because it may be repaid at any time at the option of the borrower. It could have advantages under certain circumstances, such as anticipated increases in property valuations, expected increases in Federal or state assistance, a major reduction in debt service to occur in the future, or other factors which might reduce costs or taxes or increase assets. The higher interest costs and penalties have to be weighed against the probable savings that could result from early repayment.

Which Method. The proper method for a local unit to follow in financing capital outlays depends upon these variables: present and future fiscal capacity, anticipated tax rates, legal powers to tax and borrow for capital outlays, the extent of Federal and/or state aid for capital purposes, the size of the capital budget, and the frequency with which projects are to be undertaken.

A small school system with limited resources and only one school may be justified in issuing serial bonds for the longest permissable period. These bonds would be supplemented by contributions to a reserve fund when debt service is low or nonexistent. If the system had sufficient re-

sources or tax leeway, it might also meet part of the costs on a pay-as-you-go basis.

A very large school system, building schools every year, ideally would adopt a modified pay-as-you-go policy for normal replacement and growth. In any case it would avoid borrowing for the longest possible period. Practical considerations such as past debt, the total local tax burden, or the debt for municipal purposes might cause it to use a combination of pay-as-you-go, notes, and short-term bonds. A modest reserve fund might help stabilize the tax rate. Since most such units operate under debt limits, they should avoid bonds of such length as to restrict their future ability to carry on annually a defensible construction program.

The choice of method is most difficult in two types of local units—rapidly growing communities and reorganized local units which have to rehouse all or a large part of the student body in order to attain the quality of education and efficiency of operation made possible by reorganization. These units are required to provide a volume of construction in short periods of time which in a stable community could be spread over a normal construction cycle of fifty to seventy-five years. They do not have time to create reserves. Pay-as-you-go and short-term borrowing often are precluded by already high tax rates for current operation. Even if they issue bonds for the longest permissable period, the tax burden for debt service is likely to curtail the quality of their educational program. Although they need a large volume of construction immediately, they cannot get around existing debt limits by short-term borrowing. Where their valuations are increasing and as they may approach the saturation point in building, the issuance of callable bonds might be advisable. They are most dependent upon Federal and/or state assistance to cope with their problems in a satisfactory manner.

POWERS TO BORROW AND TAX FOR CAPITAL IMPROVEMENTS

Almost all states impose debt limits on school districts. These range from 2½ to 20 per cent, the usual limit being from 5 to 15 per cent of assessed valuation. Restrictions on local borrowing power may be written in the state constitution, or established by enactment of the state legislature, or prescribed in the city charter. A maximum limit on tax rate for bond interest and sinking fund can be more restrictive than a debt limitation because it may impair credit status. In some states a state agent such as the comptroller or state attorney-general is granted power to approve bond issues and to control the length of issue according to construction classification of the buildings to be erected.

There may be ample justification for state regulation of borrowing by

local units. Properly constituted regulation protects the interests of the property owner against excessive accumulation of public debt where his property is subject to taxation by several overlapping and independent units of local government. It helps to forestall the encroachment of debt service upon necessary revenues for current operation. It prohibits the ill-advised future obligation of property to support an unreasonable burden of capital improvement. But perhaps most important, it may safeguard and preserve the credit rating of local government.

Many of the existing debt and tax limitations are archaic and unduly restrict the power of localities to meet their essential needs. Such restriction becomes damaging where the local assessed valuation per child is insufficient to support adequate schools, or where the child population is increasing faster than the amount of assessed valuation, or where the law or local practice does not permit a school district to adjust assessments to full market value, or where prior indebtedness does not allow enough debt leeway to meet new conditions and new school-plant needs. Consequently there is a tendency for state and Federal government to provide various forms of easement. One way is to take nonproperty revenue collected at the state and Federal level and distribute it as grants for school construction. Several states have developed an equalization plan for distributing such grants. The debt limit in some states with state assessment-equalization boards is imposed on full rather than assessed valuation of property; in others the limit is avoided by various schemes whereby the state assumes a portion of the local indebtedness in a state school-building authority. Each year brings forth a prolific variety of legislative easements on school-district debt limits, and the school administrator is advised to study thoroughly the applicable laws of his particular state.

The restrictions on local borrowing power may apply not only to total amount of indebtedness but also to purpose, methods, authorization, term, interest rate, priority of purchase, retirement, and form varying according to the state. To achieve regularity of bond elections, school-board meetings and resolutions, bond-sale advertisements, bond marketing, and legal records, the school board will require the services of legal counsel including a bond attorney.

The school administrator can usually obtain advice from the legal and finance branches of his state department of education. In fact, this step is recommended because eventually he has to budget both the capital improvement and the annual operating costs of the school system. Where the tax levy of a school district is limited by law or by another agency, the school administrator must prepare a long-range financial plan concerning both debt service and current expenditure within the limit of funds available before proceeding with a school-building program. He

may find in the debt- or tax-restriction laws of his state many allowances for local easement, if he seeks proper advice in the early survey and planning stage of the school-building program.

In most states school administrators should work together to remove unduly restrictive legal limitations. At the very least they should work to get them based upon equalized full valuation, as in New York and Wisconsin.

Debt limits based upon the assessed valuation of real property, unless the percentages are realistic, can become acutely restrictive. Not many school districts assess property on a 100 per cent basis. Assessments tend to lag several years behind in periods of rising price and values. Restrictions upon the creation of local reserve funds for school buildings and the imposition of property-tax limits often make it difficult to finance school buildings without borrowing or with a minimum of borrowing. To accompany these restrictions with voting requirements that enable minorities to block bond issues prevents many localities which are otherwise able from financing their actual school-building requirements.

Some states have attempted to get around the restrictions placed upon local financing of school buildings by creating state or local school-building authorities which rent facilities to local operating units. Among the states that have such authorities are Georgia, Indiana, Maine, and Pennsylvania.

The creation of separate authorities could have many objectionable features. It may remove responsibility from regularly constituted governmental units and involve dual control of school property. It may weaken the control of school systems over the type of plant required to meet their educational needs. Unless the state authorities can establish a sound credit status, it actually could increase the cost of building programs. Authority bonds often carry a higher rate of interest than other forms of bonds because the market is more restricted by law and such authorities generally lack the taxing powers of other governmental units. The authority device is no substitute for a direct attack upon outdated, unduly restrictive debt or tax limitations and for the strengthening of local initiative.

Marketing School Bonds. Marketing bonds at the most favorable rate of interest is a major responsibility of the school management. The average prevailing interest rate on school bonds may be seen by referring to the current issue of Clark's Index.[1] The interest rate on municipal bonds reflects the competitive situation of the money market, although in recent years Federal activity and regulation have exercised a stabilizing influence.

School districts individually and collectively should be aware of factors

[1] *School Executive* magazine series.

considered by investors. A statutory debt limitation may or may not be beneficial to marketing bonds, especially where overlapping debt-creative municipal districts exist; but a limitation on tax rate for debt service causes a risk that careful investors tend to avoid. Statutory limits based on full valuation of taxable property are adequate. The rate of assessment and local tax administration should, for best results, meet the requirements of such important investors as insurance companies, savings banks, and trust funds. Bonds for a specific purpose bearing the approval of the voters are thought to be more reliable. The preparation of bonds is important, especially that principal and semiannual interest be payable in a large financial center and that details of printing and authorization be strictly enforced. The opinion of a recognized bond attorney or bonding company is essential.

A major factor affecting interest rates is the school system's credit rating. Among the well-known credit agencies maintaining ratings on political subdivisions are Dun and Bradstreet, Inc., Poor's Publishing Co., and Moody's Investors Service.

If a school system does not have the highest rating, it should immediately supply the necessary information to the rating agency to improve its standing. A school system can advertise its credit standing so as to attract competition for the purchase of its bond issue. The variance in interest rates among school-bond sales of like maturities issued at the same time indicates that some school districts are more successful in establishing their credit and in attracting competitive bids than others.

If prevailing interest rates are abnormally high, it may be necessary to reject all bids, issue bond-anticipation notes,[2] or market callable bonds. There has recently come into use a low-interest serial-redemption sinking-fund type of bond on which the obligations are paid off in serial order as rapidly as accumulations from a continuing levy permit. This instrument, where permitted, is flexible enough to enable the acceleration of redemption in good periods and deceleration of redemption when revenues decrease. However, attention is called to the costs inherent in this type of obligation discussed previously.

Advertising the Bond Issue. McClurkin[3] states that widespread advertising is a good investment. Information that should be published in the sale notice includes full legal name of the borrower; complete title of the bond issue; hour, date, and place of bid opening; date of bonds

[2] New York State during the recent period of high interest rates authorized the issuance of bond-anticipation notes for a period up to five years.

[3] W. D. McClurkin, "Finance and the School Plant," *Problems and Issues in Public School Finance*, chap. XII, National Conference of Professors of Educational Administration, Bureau of Publications, Teachers College, Columbia University, New York, 1952.

(maturity dates and optional dates, if callable); when and where interest will be paid; denomination; registration, and options regarding same; basis of bidding; basis of award, circumstances under which bids may be rejected; specifications with reference to par; nature of certified check; name of legal counsel; sealing and endorsing of bids; name of printer; declaration as to who will bear the cost of printing and of legal opinion; statement as to sufficiency of the tax levy; population (last Federal Census and current estimate); and eligibility of the district for legal investment lists.

Competent advice should be secured from the bonding attorneys and possibly from an unbiased bond buyer as to the time and conditions of sale of bonds, taking care that the sale is not prejudiced in favor of particular buyers. The timing of a sale in relation to other issues being offered, generally a time removed by at least a few days from the sale of any other large issue even at a considerable distance, will affect the bids and the price considerably.

Sale of bonds should be advertised in a financial publication of national circulation such as *The Daily Bond Buyer*,[4] *The Wall Street Journal*, *The New York Times*, *Commercial and Financial Chronicle*, *The Financial Reporter*, and *The Chicago Journal of Commerce*. The bidder should be given an opportunity to name the coupon rate. Premiums are better absorbed in lower bids on interest rates.

It is customary to have a prospectus prepared for prospective bond buyers. Linn[5] has suggested that as a means of assuring prospective investors and encouraging competition for lowest interest rates the school officials should prepare a statement on the following topics that may be sent out to interested buyers who are seeking information.

CHECK LIST OF INFORMATION FOR PROSPECTIVE BUYERS

1. Name of school district issuing bonds; address.
2. Date of sale; hour; and place.
3. Amount of issue; purpose; amount to be sold at the time.
4. Rate of interest (if stipulated); payments to be made semiannually or annually.
5. Denomination.
6. Date of bonds; schedule of maturity dates.
7. If optional for payment, state when.
8. Dates for paying interest and principal.
9. Interest and principal payable in what city?
10. Are bonds registerable as to principal, as to interest?

[4] *The Daily Bond Buyer*, New York.

[5] Henry H. Linn, *Practical School Economics*, Bureau of Publications, Teachers College, Columbia University, New York, 1934, pp. 367–368.

11. Sealed or auction bids.
12. If deposit is required, state kind and amount.
13. When are bonds to be delivered?
14. Authority for issue (give chapter and section of law).
15. If bonds voted, give date of election, and votes for and against.
16. Are bonds free from state and local taxation?
17. Has the unit issuing bonds ever defaulted on the payment of principal or interest of any bond issue?
18. Have any previous issues of bonds been contested?
19. Is there any controversy or litigation pending or threatening the corporate existence or the boundaries of the issuing units, or the title of its present officials to their respective offices, or the validity of these bonds or any other outstanding bonds?
20. Are additional bond issues contemplated within the next year? If so, state what kind and amount.
21. Legality approved by whom? Cost of approval to be paid by whom?
22. What is lowest price at which bonds can be legally sold?
23. Population according to latest census; estimated present population.
24. Acreage of district; average value per acre.
25. Principal resources and industries.
26. Tax rate per $1,000 for all purposes.
27. Total tax rate per $1,000 allowed by law.
28. Legal limitation of total indebtedness.
29. Date taxes are levied.
30. Who will furnish bonds and pay for cost of printing?
31. Financial statement: (*a*) estimated value of taxable property; (*b*) assessed value of taxable property; (*c*) assessed value, realty only; (*d*) total bonded debt (exclusive of new issue); (*e*) floating debt; (*f*) sinking fund.

SOURCES OF REVENUE FOR CAPITAL IMPROVEMENTS

Most state laws relating to financing capital outlays presume the property tax as the only source of local revenue. During the past decade at least, there has been some tendency to broaden local taxing powers for schools, particularly in states like New York and Pennsylvania.

Many city school systems in other states derive part of their school revenues from local nonproperty taxes. This trend has important implications for credit status and for tax and debt limits. If a local unit is deriving about half of its revenues for current operations and debt service from such local nonproperty sources, debt limits based either upon the full valuation or the assessed valuation of property are not entirely realistic. Yet few, if any, state laws have been modified in terms of this development, either for schools or for other local governmental purposes.

In periods of emergency Federal support for school construction has been substantial in many local school units. State assistance for school

(maturity dates and optional dates, if callable); when and where interest will be paid; denomination; registration, and options regarding same; basis of bidding; basis of award; circumstances under which bids may be rejected; specifications with reference to par; nature of certified check; name of legal counsel, sealing and endorsing of bids; name of printer; declaration as to who will bear the cost of printing and of legal opinion; statement as to sufficiency of the tax levy; population (last Federal Census and current estimate); and eligibility of the district for legal investment lists.

Competent advice should be secured from the bonding attorneys and possibly from an unbiased bond buyer as to the time and conditions of sale of bonds, taking care that the sale is not prejudiced in favor of particular buyers. The timing of a sale in relation to other issues being offered, generally a time removed by at least a few days from the sale of any other large issue even at a considerable distance, will affect the bids and the price considerably.

Sale of bonds should be advertised in a financial publication of national circulation such as *The Daily Bond Buyer*,[4] *The Wall Street Journal*, *The New York Times*, *Commercial and Financial Chronicle*, *The Financial Reporter*, and *The Chicago Journal of Commerce*. The bidder should be given an opportunity to name the coupon rate. Premiums are better absorbed in lower bids on interest rates.

It is customary to have a prospectus prepared for prospective bond buyers. Linn[5] has suggested that as a means of assuring prospective investors and encouraging competition for lowest interest rates the school officials should prepare a statement on the following topics that may be sent out to interested buyers who are seeking information.

CHECK LIST OF INFORMATION FOR PROSPECTIVE BUYERS

1. Name of school district issuing bonds; address.
2. Date of sale; hour; and place.
3. Amount of issue, purpose; amount to be sold at the time.
4. Rate of interest (if stipulated); payments to be made semiannually or annually.
5. Denomination.
6. Date of bonds; schedule of maturity dates.
7. If optional for payment, state when.
8. Dates for paying interest and principal.
9. Interest and principal payable in what city?
10. Are bonds registerable as to principal; as to interest?

[4] *The Daily Bond Buyer*, New York.
[5] Henry H. Linn, *Practical School Economies*, Bureau of Publications, Teachers College, Columbia University, New York, 1934, pp. 367–368.

11. Sealed or auction bids.
12. If deposit is required, state kind and amount.
13. When are bonds to be delivered?
14. Authority for issue (give chapter and section of law).
15. If bonds voted, give date of election, and votes for and against.
16. Are bonds free from state and local taxation?
17. Has the unit issuing bonds ever defaulted on the payment of principal or interest of any bond issue?
18. Have any previous issues of bonds been contested?
19. Is there any controversy or litigation pending or threatening the corporate existence or the boundaries of the issuing units, or the title of its present officials to their respective offices, or the validity of these bonds or any other outstanding bonds?
20. Are additional bond issues contemplated within the next year? If so, state what kind and amount.
21. Legality approved by whom? Cost of approval to be paid by whom?
22. What is lowest price at which bonds can be legally sold?
23. Population according to latest census; estimated present population.
24. Acreage of district; average value per acre.
25. Principal resources and industries.
26. Tax rate per $1,000 for all purposes.
27. Total tax rate per $1,000 allowed by law.
28. Legal limitation of total indebtedness.
29. Date taxes are levied.
30. Who will furnish bonds and pay for cost of printing?
31. Financial statement: (*a*) estimated value of taxable property; (*b*) assessed value of taxable property; (*c*) assessed value, realty only; (*d*) total bonded debt (exclusive of new issue); (*e*) floating debt; (*f*) sinking fund.

SOURCES OF REVENUE FOR CAPITAL IMPROVEMENTS

Most state laws relating to financing capital outlays presume the property tax as the only source of local revenue. During the past decade at least, there has been some tendency to broaden local taxing powers for schools, particularly in states like New York and Pennsylvania.

Many city school systems in other states derive part of their school revenues from local nonproperty taxes. This trend has important implications for credit status and for tax and debt limits. If a local unit is deriving about half of its revenues for current operations and debt service from such local nonproperty sources, debt limits based either upon the full valuation or the assessed valuation of property are not entirely realistic. Yet few, if any, state laws have been modified in terms of this development, either for schools or for other local governmental purposes.

In periods of emergency Federal support for school construction has been substantial in many local school units. State assistance for school

(maturity dates and optional dates, if callable); when and where interest will be paid; denomination; registration, and options regarding same; basis of bidding; basis of award; circumstances under which bids may be rejected; specifications with reference to par; nature of certified check; name of legal counsel; sealing and endorsing of bids; name of printer; declaration as to who will bear the cost of printing and of legal opinion; statement as to sufficiency of the tax levy; population (last Federal Census and current estimate); and eligibility of the district for legal investment lists.

Competent advice should be secured from the bonding attorneys and possibly from an unbiased bond buyer as to the time and conditions of sale of bonds, taking care that the sale is not prejudiced in favor of particular buyers. The timing of a sale in relation to other issues being offered, generally a time removed by at least a few days from the sale of any other large issue even at a considerable distance, will affect the bids and the price considerably.

Sale of bonds should be advertised in a financial publication of national circulation such as *The Daily Bond Buyer*,[4] *The Wall Street Journal*, *The New York Times*, *Commercial and Financial Chronicle*, *The Financial Reporter*, and *The Chicago Journal of Commerce*. The bidder should be given an opportunity to name the coupon rate. Premiums are better absorbed in lower bids on interest rates.

It is customary to have a prospectus prepared for prospective bond buyers. Linn[5] has suggested that as a means of assuring prospective investors and encouraging competition for lowest interest rates the school officials should prepare a statement on the following topics that may be sent out to interested buyers who are seeking information.

CHECK LIST OF INFORMATION FOR PROSPECTIVE BUYERS

1. Name of school district issuing bonds; address.
2. Date of sale; hour; and place.
3. Amount of issue; purpose; amount to be sold at the time.
4. Rate of interest (if stipulated); payments to be made semiannually or annually.
5. Denomination.
6. Date of bonds; schedule of maturity dates.
7. If optional for payment, state when.
8. Dates for paying interest and principal.
9. Interest and principal payable in what city?
10. Are bonds registerable as to principal; as to interest?

[4] *The Daily Bond Buyer*, New York.

[5] Henry H. Linn, *Practical School Economies*, Bureau of Publications, Teachers College, Columbia University, New York, 1934, pp. 367–368.

11. Sealed or auction bids.
12. If deposit is required, state kind and amount.
13. When are bonds to be delivered?
14. Authority for issue (give chapter and section of law).
15. If bonds voted, give date of election, and votes for and against.
16. Are bonds free from state and local taxation?
17. Has the unit issuing bonds ever defaulted on the payment of principal or interest of any bond issue?
18. Have any previous issues of bonds been contested?
19. Is there any controversy or litigation pending or threatening the corporate existence or the boundaries of the issuing units, or the title of its present officials to their respective offices, or the validity of these bonds or any other outstanding bonds?
20. Are additional bond issues contemplated within the next year? If so, state what kind and amount.
21. Legality approved by whom? Cost of approval to be paid by whom?
22. What is lowest price at which bonds can be legally sold?
23. Population according to latest census; estimated present population.
24. Acreage of district; average value per acre.
25. Principal resources and industries.
26. Tax rate per $1,000 for all purposes.
27. Total tax rate per $1,000 allowed by law.
28. Legal limitation of total indebtedness.
29. Date taxes are levied.
30. Who will furnish bonds and pay for cost of printing?
31. Financial statement: (*a*) estimated value of taxable property; (*b*) assessed value of taxable property; (*c*) assessed value, realty only; (*d*) total bonded debt (exclusive of new issue); (*e*) floating debt; (*f*) sinking fund.

SOURCES OF REVENUE FOR CAPITAL IMPROVEMENTS

Most state laws relating to financing capital outlays presume the property tax as the only source of local revenue. During the past decade at least, there has been some tendency to broaden local taxing powers for schools, particularly in states like New York and Pennsylvania.

Many city school systems in other states derive part of their school revenues from local nonproperty taxes. This trend has important implications for credit status and for tax and debt limits. If a local unit is deriving about half of its revenues for current operations and debt service from such local nonproperty sources, debt limits based either upon the full valuation or the assessed valuation of property are not entirely realistic. Yet few, if any, state laws have been modified in terms of this development, either for schools or for other local governmental purposes.

In periods of emergency Federal support for school construction has been substantial in many local school units. State assistance for school

(maturity dates and optional dates, if callable); when and where interest will be paid; denomination; registration, and options regarding same; basis of bidding; basis of award; circumstances under which bids may be rejected; specifications with reference to par; nature of certified check; name of legal counsel; sealing and endorsing of bids; name of printer; declaration as to who will bear the cost of printing and of legal opinion; statement as to sufficiency of the tax levy; population (last Federal Census and current estimate); and eligibility of the district for legal investment lists.

Competent advice should be secured from the bonding attorneys and possibly from an unbiased bond buyer as to the time and conditions of sale of bonds, taking care that the sale is not prejudiced in favor of particular buyers. The timing of a sale in relation to other issues being offered, generally a time removed by at least a few days from the sale of any other large issue even at a considerable distance, will affect the bids and the price considerably.

Sale of bonds should be advertised in a financial publication of national circulation such as *The Daily Bond Buyer*,[4] *The Wall Street Journal*, *The New York Times*, *Commercial and Financial Chronicle*, *The Financial Reporter*, and *The Chicago Journal of Commerce*. The bidder should be given an opportunity to name the coupon rate. Premiums are better absorbed in lower bids on interest rates.

It is customary to have a prospectus prepared for prospective bond buyers. Linn[5] has suggested that as a means of assuring prospective investors and encouraging competition for lowest interest rates the school officials should prepare a statement on the following topics that may be sent out to interested buyers who are seeking information.

CHECK LIST OF INFORMATION FOR PROSPECTIVE BUYERS

1. Name of school district issuing bonds; address.
2. Date of sale; hour; and place.
3. Amount of issue; purpose; amount to be sold at the time.
4. Rate of interest (if stipulated); payments to be made semiannually or annually.
5. Denomination.
6. Date of bonds; schedule of maturity dates.
7. If optional for payment, state when.
8. Dates for paying interest and principal.
9. Interest and principal payable in what city?
10. Are bonds registerable as to principal; as to interest?

[4] *The Daily Bond Buyer*, New York.

[5] Henry H. Linn, *Practical School Economies*, Bureau of Publications, Teachers College, Columbia University, New York, 1934, pp. 367–368.

from state and local educational agencies. The Federal government exercises control over the program through approval of plans and specifications and inspection and review of progress in construction. It also establishes priorities of need, since funds are not sufficient to provide for all eligible local units. Despite the absence of a well-conceived policy, the centralizing tendencies, and other inadequacies of measures adopted since 1940 to aid localities with school-building financial problems, Federal action has sought to solve critical schoolhousing problems.

The expansion of Federal government activities into economics has had just as serious effects upon local school-building problems as has war or the preparation for war. Yet no recognition has yet been made of this fact. Federal policies relating to veterans, housing, credit for financing housing (FHA, for example) have caused shifts in population, causing underutilized schools in some areas and leading to overcrowding in others. The burden of Federal taxes for benefits to various economic groups and others, as well as for defense, has affected the ability and willingness of localities and states to finance school construction. Federal borrowing and credit policies greatly affect the interest rates that localities and states must pay. The combined impact of all Federal policies and activities upon state and local public finance should be studied as a basis for formulating a sound policy for Federal participation.

The ultimate policy to be adopted may or may not involve any permanent Federal financial assistance for school buildings. Reduction of the Federal debt, Federal tax reduction, Federal-state allocation of tax sources, and Federal tax reform could increase local ability and willingness to finance schools more than any program of inadequate Federal financial assistance toward school construction from the standpoint of stimulation. However, this type of support has not yet been fully explored.

The development of satisfactory Federal-state relationships in any program of financial aid for school buildings requires (1) the use of a small part of any such funds to aid states in strengthening their school-building services in the state educational agency; (2) the use of a small part of the funds to assist states in developing improved programs for financing capital outlays; (3) development of an objective method of allocating Federal funds to states according to relative need and relative ability to pay; (4) apportionment of such funds to localities according to state laws; and (5) Federal control over funds being limited to research, leadership, and audits.

State Assistance for Capital Outlays. During the first half of the century not many states—only about a fourth—made provisions for financing school buildings. At the present time, however, about half the states have taken steps to aid in the financing of buildings.

Most state plans for financing capital outlays may be classified as emer-

construction has increased in recent decades. These sources of revenue should be thoroughly explored and action taken to improve and increase them.

Federal Support for Schoolhouse Construction. Increased Federal activity is probable in the financing of school construction, particularly as part of a program to stimulate or to stabilize economic activity. The impact of Federal policies upon mobility of population and school construction has led to demand for assistance of various types in rapidly growing critical communities. Federal activities in relation to financing school buildings could be improved. There has been no consistent policy, and each emergency has been handled as a new experiment without sufficient consideration given to basic principles, past experience, and the evolution of sound Federal and state relationships in school finance.

During the depression years, beginning in 1933, the Federal government through the Federal Emergency Administration of Public Works (PWA) sponsored an extensive school-building program as part of a plan to relieve unemployment. Loans or grants or both were given to local school units for school construction. Grants at first were limited to 30 per cent of the cost of labor and materials, but this was later (1935) increased to 45 per cent of the cost of the project. The planning of the project itself was left to the locality, subject to whatever state laws or regulations applied.[6] Federal, state, and local relationships in PWA school building could have been improved by (1) providing that localities would have to deal only with the state educational agency in relation to school-building programs; (2) requiring Federal agencies to deal only with the regularly constituted state education agency; and (3) having all applications, approvals, reports, and other Federal administrative machinery relating to localities handled through the state agency. Later the Federal government, between 1940 and 1945, adopted temporary measures (Lanham Act) to assist localities with school buildings in war- or defense-affected areas. These were extended on a reduced scale through 1950. As the act was amended from time to time, the amount of money available for school construction, the policies to be followed, the administrative control over the program, and the methods of allocating funds to localities were changed. Frequently the grants were accompanied by rigid Federal controls, often exercised by noneducational agencies.[7] Public Law 815, enacted in 1950, was also an emergency measure designed to aid defense-affected areas to meet school-construction problems. This act is administered by the U.S. Office of Education, based upon recommendations

[6] Howard T. Herber, *The Influence of the Public Works Administration on School Construction in New York State, 1933–1936*, Bureau of Publications, Teachers College, Columbia University, New York, 1938.

[7] Educational Policies Commission, *Federal–State Relations in Education*, National Education Association, Washington, 1945, p. 9.

operating units cannot discharge its responsibility or solve school-building problems by adding inadequate allowances for capital outlays. School districts would be better able to finance school buildings from local resources if the allowances for current operations in the state-aid formula were adequate.

2. A state that requires a high local contribution in order to receive either inadequate or adequate support for current operation cannot fulfill its obligations or solve its school-building problems by adding inadequate state aid for school buildings. School districts would be better able to finance them if the state did not require as much local tax effort to support the basic program that is provided in the interest of the state.

3. The state therefore should make provisions for the financing of a defensible level of current operation and a defensible standard of school building in all school districts with a reasonable local effort.

4. A practical but crude approach is to base the level of support for the basic or foundation program for each pupil upon total expenditures rather than current expenditures.

5. A more scientific and defensible approach is to establish separate foundation programs for current operations and for school buildings for each pupil to be jointly supported by the state and its localities, since the cost of buildings depends upon when the buildings are constructed.

6. A sound program of state aid for school buildings under either of these approaches cannot be operated without a state building-reserve fund either in actuality or in theory.

7. Provisions should also be made for local reserve funds and their protection. In any year that capital outlays or debt service are less than the local contribution for school buildings, the district in order to receive any future building aid from the state would be required to deposit the difference in the reserve fund. A district would be prohibited from drawing from the fund except for specified school-building purposes.

8. Whenever a local district erects a school building, the local share and the state share of the foundation standard building is determined, and the state share is paid outright from the actual or theoretical reserve fund, using any credits possessed by the district in the fund and drawing the balance from the bank of idle credits of other districts in the state-provided fund.

9. State school-building aid should be conditional upon the attainment of satisfactory district reorganization.

10. Localities should be free to provide better facilities than those which can be financed within the minimum program jointly supported by the state and the locality.

A program involving these basic principles would have to be evolved over a long period of time unless initiated with an appropriation or a state

gency measures, measures designed to assist distressed districts, or measures designed to stimulate district reorganization. Some programs are limited to what can be financed with a fixed state bond issue or appropriation. Some are loans to school districts. Some are on a year-to-year basis. Those few that are continuing and not limited to certain districts, with an open-end appropriation (e.g., Florida and Maryland), generally are inadequate in amount. The techniques of apportionment generally are very crude. Nevertheless, the local school system should take full advantage of such laws and work for improvements in their particular states.

The state has certain financial responsibilities for school buildings. No matter what borrowing or taxing powers are granted to school districts, most states will have some local units which simply lack economic resources or taxpaying capacity sufficient to provide a defensible level of education, including a defensible standard of school buildings. The state has not discharged its responsibility for education when it delegates responsibility for education and school buildings to such units. They simply cannot provide the type of education which is in the interest of state and the nation without equalization aid. That is, the state must supplement moneys raised by a reasonable local tax effort in order to provide a foundation level of education and the school building essential to provide that program. In short, equalization aid should be based upon total expenditures for an educational program rather than upon current expenditures alone as is generally the case. Funds not needed immediately for capital outlays or debt service should be credited to the district in a state building-reserve fund to be drawn upon as needed. Then there are the newly reorganized districts, rapidly growing districts, and districts with emergency school-building requirements resulting from fire, explosion, or storm, which will have to produce within a very short period of time school buildings that normally would have been provided over a fifty- to seventy-five-year cycle.

The state is responsible for making provision for a local school-district structure which will enable the people to exercise local responsibility in education and school building. If small, unsatisfactory school districts exist, they exist because of state action or inaction. The very least a state can do in promoting the creation of satisfactory school districts is to equalize the burden of rehousing pupils from small, inefficient units, who are to attend a reorganized school system where this is educationally desirable.

The principles that should govern the formulation of a sound school-finance policy and program for a state unit of government are beginning to emerge. The major ones may be summarized as follows:

1. A state that has a school-finance program guaranteeing an inadequate level of financial support for current operations in its poorest local

operations—a subject which is beyond the scope of this book but which is a very vital element in establishing credit and obtaining the lowest possible interest rates on borrowed funds. School units are dependent almost exclusively upon the property-tax base as the direct, legal source of local revenue for schoolhouse construction. Thus in most instances the key factors become property valuation and administration of taxes upon that valuation.

Table 15-1. Assessed Valuations in Hicksville by Five-year Intervals from 1914–1915 to 1949–1950

Year	*Assessed valuations*
1914–1915	$ 890,840
1919–1920	1,116,540
1924–1925	1,924,400
1929–1930	7,752,065
1934–1935	7,764,825
1939–1940	12,186,308
1944–1945	11,773,225
1949–1950	16,738,355

In analyzing the financial ability of a local unit the subject first examined is the tax base and its wholesomeness. Since school-bond issues generally are sold on the yield of taxable real property, a tabulation is made to show the trend of assessed valuations, as illustrated in Table 15-1, quoted from the Hicksville survey.[8]

The future valuation of taxable property will depend upon population trends, new dwellings, other land improvement, such as stores, garages, offices, natural resources, and industrial plants, and the index of fair market value of taxable property.

The remarkable stability of taxable real property as a tax base for marketing school bonds can be demonstrated either by tabulating the annual tax yield or the school-tax rates. Perhaps a table of tax rates as shown in the Hicksville survey (Table 15-2) is preferable since it suggests the burden of the public to support schools.[9]

Since a bond issue will be retired over a period of years, the ability of the district to levy taxes is estimated within the limits of economic factors projected some years into the future. The liabilities as well as the taxable

[8] Institute of Field Studies, *The Report of the Survey of the Building Requirements of the Union Free School District Number 17, Hicksville, New York*, Bureau of Publications, Teachers College, Columbia University, New York, 1950.

[9] *Ibid.*

bond issue large enough to meet the initial demands for funds. Yet unless the reserve-fund approach is used, states have to resort to less-satisfactory plans based upon priorities, as in California, or state assumption of part of debt service, as in New York, in order to meet the urgent needs of districts that must erect buildings in a short time which normally would be spread over a period of years, namely, the newly reorganized districts which have to rehouse most pupils in order to attain a satisfactory and economical school program, the rapidly growing districts, and the districts where the only building in the district or a high proportion of the buildings are damaged or destroyed before the debt upon them is paid off. Adequate allowances for capital outlays in the total foundation program per child or the inadequate provisions in most other types of state-support programs will fail to meet the school-building problems of such districts.

No state has a program for financing school buildings which incorporates over one or two of these principles. In New York State, for example, aid for central school buildings and for emergency school building is based upon principle 5 and parts of 1, 3, and 8. The state has a separate foundation program for certain school buildings which is based upon costs at the time of construction, and a method is provided for defining the state and local share of the cost. The framework of a comprehensive plan of state foundation support for school building would seem to incorporate the principles of fixed-asset accounting and depreciation reserve. Assuming a replacement cycle of fifty years on the total school plant in the state, the state would undertake to support above an equalized local effort a fiftieth of the value of such plant on the average each year. Of course, the theory would have to be flexible enough to allow for economic changes, growth in school population, and especially the certain development of new educational methods and purposes.

Local Revenues for Capital Improvement. The major economy in capital financing from the standpoint of local revenue comes from avoiding borrowing which entails interest or borrowing for the shortest possible time to reduce interest costs. Much depends upon the proper choice of method of finance for the particular conditions existing in the community and the skillful marketing of bonds. Other important sources of economy are improving the credit status of the local unit through strengthening the local tax base, securing modifications in unduly restrictive tax and debt limits, and obtaining new sources of revenue.

Fiscal capacity. Fiscal capacity of a local unit of government may be defined as its ability to raise revenues under its existing taxing powers. For purposes of establishing its credit status, this definition narrows to ability to meet its debt service under its tax structure. This in turn involves the whole scope of the efficiency of management of its current

Florida, West Virginia, and Texas.[11] Indices of property-tax ability may be constructed by counties and the subunits prorated according to county-assessment equalization so that an economic index becomes a rough instrument to measure the relative potential ability of school districts.

Increasing local-revenue potential. Improvement of local resources for school-plant construction lies along two lines: (1) relieving the property-tax base from other burdens to make more local ability available for school-plant development and (2) better business practices in administration of the school-tax base. The complicated nature of overlapping taxing districts and units of local government may appear very complex to the average school administrator. The property taxpayer contributes to several units of local government. Most of these agencies receive substantial amounts of property-tax revenue.

Table 15-3. School-debt Retirement Schedule, Hicksville, New York

Fiscal year	*Outstanding Indebtedness July 1*	*Annual bond retirement*	*Balance June 30*
July 1, 1949–June 30, 1950	$150,000	$15,000	$135,000
July 1, 1950–June 30, 1951	135,000	15,000	120,000
July 1, 1951–June 30, 1952	120,000	15,000	105,000
July 1, 1952–June 30, 1953	105,000	15,000	90,000
July 1, 1953–June 30, 1954	90,000	15,000	75,000
July 1, 1954–June 30, 1955	75,000	15,000	60,000
July 1, 1955–June 30, 1956	60,000	15,000	45,000
July 1, 1956–June 30, 1957	45,000	15,000	30,000
July 1, 1957–June 30, 1958	30,000	15,000	15,000
July 1, 1958–June 30, 1959	15,000	15,000	0

Mort and Reusser[12] list four measures that can be taken to lessen the strain on the property tax: (1) services formerly operated by local authorities transferred bodily to the state or Federal government; (2) grants-in-aid for particular services; (3) nonproperty taxes made available for levy and collection by the communities themselves; and (4) taxes designed to reach new forms of wealth, levied by the state and shared in one way or another with the communities more or less roughly in proportion to the amount of such taxes paid by the residents of the community.

Most school districts receive directly or indirectly some state or Federal support deriving originally from nonproperty taxes which pays a

[11] Arvid J. Burke, *Financing Public Schools in the United States*, Harper & Brothers, New York, 1957, p. 653.

[12] Paul R. Mort and Walter C. Reusser, *Public School Finance*, McGraw-Hill Book Company, Inc., New York, 1951.

assets of the school district must be considered. The difference between taxable assets and liabilities is one measure of tax leeway for debt service on new school-plant construction.

The bonding leeway of a school district as reported in the Hicksville survey (Table 15-3) may be estimated from a tabulation of amortization on existing indebtedness.[10]

Table 15-2. School-tax Rate in Hicksville, 1929–1930 to 1949–1950 Inclusive

Year	*Tax rate per $100 valuation*
1929–1930	$2.31
1930–1931	2.49
1931–1932	2 24
1932–1933	1.74
1933–1934	1.87
1934–1935	1.97
1935–1936	1.60
1936–1937	1.63
1937–1938	1.75
1938–1939	1.54
1939–1940	1.20
1940–1941	1.20
1941–1942	1.23
1942–1943	1.34
1943–1944	1.48
1944–1945	1.63
1945–1946	1.44
1946–1947	1.81
1947–1948	2 20
1948–1949	1.63
1949–1950	1.77

Were it not possible for a school district to improve its ability to support schools, one would simply stop with the above analysis of tax leeway. Oftentimes the potential local ability is considerably greater than existing assessments and tax rates would indicate. The relative taxpaying ability of school districts cannot be measured by assessed valuation of real property except as such assessments are equalized. Among the states that have attempted equalization of assessments are Kansas, Louisiana, Michigan, Missouri, New York, Ohio, Pennsylvania, and Wisconsin; among those that have adopted economic indices for this purpose are Alabama,

[10] *Ibid.*

SUMMARY

The local unit requires a complete financial plan for its school-plant program. Not only must each project be carefully budgeted, but the most prudent and economical arrangement must be effected for the support of capital outlays and debt service. Pay-as-you-go financing, either in total or in part, has obvious advantages in the large saving of interest costs and, when combined with reserve funds, in the stabilization of local tax rates.

In most local units the financial support has to be prorated over a period of years, as in issuing serial bonds. However, the school administrator should seek to reduce the cost of borrowing. To a considerable extent, school districts are governed and restricted by law in the types of borrowing available to them. These laws both grant their powers and protect their credit status.

The marketing of bonds presents problems in management. The type of bond will determine its payment schedule and often its interest costs. Callable bonds may be useful in certain instances, but generally cost more. Experience has shown that a complete prospectus and proper advertising methods are proved ways of obtaining lowest interest rates on borrowings.

The revenue for capital outlays may come from Federal, state, or local sources. Although local property taxes are still the mainstay of schoolhouse finance, there is a trend toward using more nonproperty-tax revenue for this purpose, either through intergovernmental subventions and similar relief or through enabling legislation. Federal support may take either of two directions, direct assistance (now limited in Public Law 815) or economic support. The latter as it affects school districts in various states has not been fully explored.

State assistance to schoolhouse construction is becoming widespread, although it as yet is insufficient and experimental, responding to immediate pressures. The trend is toward equalized grants, based upon improved measures of need as an integral part of state foundation-support policy for education. Every effort should be made in the development of these plans to strengthen local initiative.

Fiscal ability at the local-unit level is generally estimated in terms of either assessed or full value of the property-tax base and its product. The state government should lend support in the strengthening of this important revenue base. The local unit should not at any time neglect its responsibility for promoting accurate and complete property assessment.

DISCUSSION PROBLEMS

1. How may the various objections to local reserve funds for school-plant development be overcome?
2. What would be some of the outcomes of a state school-building program? Show where this might lead to better planning for a long-range educational program.
3. What have been found to be the advantages and difficulties of incorporating state aid for school-plant construction in the state-assured foundation school

substantial part of the current expense of operating and maintaining schools. Such assistance to the current-expenditure section of the school budget eases the burden on local property taxes and therefore releases local revenue for schoolhouse construction. School districts may seek further relief by broadening the local tax base, encouraging the subvention of state revenues to local government, or shifting local property-tax revenues from such services as highways, hospitals, welfare, or municipal services to school-plant construction. These possibilities constitute an interesting area of economics and political science that has to do with school fiscal support in general and the distribution of burden and control among the various agencies of government.

Property assessment. The school board may or may not have under its control the management of property assessment and property-tax levy. If school districts are to rely largely upon the property tax for support of their essential needs for many years in the future, a planned conservation of the property-tax base deserves watchful attention. Kendrick[13] has reported that the assessment of real property tends to lag about eight years behind such other economic trends as commodity prices, farm real estate, corporation profits, unincorporated business income, building cost of a six-room house, new construction activity, and family income. Moreover, it was found that careful scrutiny ought to be paid the matter of exemption of property from the assessment rolls.

The wholesomeness of the property-tax base is chiefly a question of good assessment practice. Although in many states about half the assessed valuation is on utility, industrial, or business property, the criticism of property taxes is seldom so much the amount of tax levy that burdens the property owner as the supposed or real inequities and injustices of the property assessment. Kendrick proposed that assessment units should be of adequate size to permit the employment of qualified assessors and that enough should be spent on the work of assessment to enable the use of scientific methods. Small school districts would advance their welfare by adopting classified property records instead of the old-fashioned property roll books.

State supervision of property-assessment methods is encouraged by many writers as a way to avoid the pressures that arise from weakening of the tax base through careless assessment practices. Certainly most districts could tremendously enhance their local ability during periods of monetary inflation by applying current fair-market value or at least shortening the time lag in adjusting property assessments to economic trends.

[13] M. Slade Kendrick and Wallace H. Strevell, *The Property Tax as a Fiscal Instrument in New York State,* Staff Study no. 7 of the Fiscal Policy Study for Public Education in New York State, Educational Conference Board, New York State Teachers Association, Albany, N.Y., 1947.

Chase, Francis S., and Edgar L. Morphet: *The Forty-eight State School Systems*, The Council of State Governments, Chicago, 1949.

Cornell, Francis G.: *A Measure of Taxpaying Ability of Local School Administrative Units*, Bureau of Publications, Teachers College, Columbia University, New York, 1936.

Craigie, Walter W.: "Funds for Schools," *American School Board Journal*, 134:47–49, February, 1957.

De La Fleur, Frederick J.: "Investigate Now for Your Next Sale of Bonds," *Nation's Schools*, 60:60–64, September, 1957.

Ellinwood, David M.: "Better Credit Assures a Better Break for Your Taxpayers," *American School Board Journal*, 130:69 ff., January, 1955.

Essex, Don L.: *Bonding Versus Pay-as-You-Go in the Financing of School Buildings*, Bureau of Publications, Teachers College, Columbia University, New York, 1931.

Grossnickle, F. E.: *Capital Outlay in Relation to a State's Minimum Educational Program*, Bureau of Publications, Teachers College, Columbia University, New York, 1931.

Ireland, Dwight B.: "A Plan of Presentation for a School Bond Issue," *American School Board Journal*, 121:31, August, 1950.

Johns, R. L.: "Money for Schools," *School Executive*, 74:88–89, January, 1955.

——— and E. L. Morphet (eds.): *Problems and Issues in Public School Finance*, National Conference of Professors of Education Administration, Bureau of Publications, Teachers College, Columbia University, New York, 1952.

Kendrick, M. S.: *Public Finance*, Houghton Mifflin Company, Boston, 1951.

Linn, Henry H. (ed.): *School Business Administration*, The Ronald Press Company, New York, 1956. chap. 12.

Moody's Manual of Investments; Government Securities, Moody's Investors Service, New York, 1952.

Morphet, E. L.: "Financing School Building Programs," *American School Board Journal*, 119:20–22, September, 1949.

——— and J. E. Corbally: "How Shall We Finance New School Buildings?" *The American School and University*, 28:173–182, 1956.

National Council of Chief State School Officers: *Our System of Education*, Washington, 1950.

National Education Association: "Fiscal Authority of City Schoolboards," *Research Bulletin*, 28:2, April, 1950.

Quattlebaum, Charles A.: *Federal Aid to School Construction*, U.S. Government Printing Office, Washington, 1954.

Reller, Theodore L.: "School Building Authorities—Status, Contributions, and Limitations," *American School Board Journal*, 127:61–62, September, 1953.

Strevell, Wallace H.: *State Aid for Central School Building*, Bureau of Publications, Teachers College, Columbia University, New York, 1949.

U.S. Office of Education: *State Provisions for Financing Public-school Capital Outlay Programs*, No. 6, Washington, 1951.

———: *Financing Public School Facilities*, No. 32, Washington, 1959.

program? Can this be done successfully without creating a state school-building-reserve fund?

4. To what extent would state-collected taxes shared with school districts on a per capita basis achieve a reasonable and equitable apportionment for financing the required school-building programs?

5. Discuss the argument that taxpayers can use the tax money to better advantage in the economy than the school district could in its investment of a building-reserve fund; hence it is more economical for the local school unit to borrow money at low interest rates as a general method of financing school construction.

6. What have been found to be the characteristics of "hard-pressed" districts? And how may relief be afforded most directly? Is school-district reorganization generally the solution?

7. Demonstrate the various types of school bonds. Discuss the feasibility of issuing callable bonds that will admit of possible refinancing at some future date. When are short-term bond issues advisable; when are longer-term bond issues necessary?

8. Give the history of Federal participation in the finance of school buildings. What factors have dominated Federal interest in the situation? What benefits would your state derive from any proposed Federal legislation affecting school building?

9. Discuss the advantages and disadvantages of the independence of school taxation from other local taxing agencies. What are the major causes of resistance to achieving a full evaluation of taxable property? What relief could be gained by permissive local nonproperty-tax powers?

10. Describe some of the problems encountered in your state in attempting to achieve financially adequate organization of school districts. What are the arguments for and against state-imposed tax-rate limits?

11. Prepare a chart showing the major factors of a long-range school-building program in their proper perspective and relationship; and indicate on the chart the appropriate time for steps leading up to and including the school-bond election. Illustrate how overlapping indebtedness of local government units may affect the prudent timing of a school-bond election.

12. Would an equalization plan or a flat-grant plan of Federal financial participation in school-plant development involve more Federal control? To what extent would the credit of the school district be affected?

RELATED READINGS

Burke, Arvid J.: *Financing Public Schools in the United States,* Harper & Brothers, New York, 1957.

———: "Some Proposals for Better Financing of Schoolhouse Construction," *Nation's Schools,* 53:48–51, February, 1954.

Castetter, William B.: *Public School Debt Administration,* University of Pennsylvania Press, Philadelphia, 1958.

———: "Suggestions for Planning School Bond Issues," *The American School and University,* 21:59–63, 1949.

Other agencies involved should be given all essential facts before they are asked to act or approve. Every opportunity should be utilized to interpret what is being done, even to building-progress reports, dedication ceremonies, and accounts of the use made of the facilities once occupied.

Successful community relations in a school-building program hinge upon the answers to three questions. How can the attention of the public be held on the subject of school-building needs so that an accurate and complete understanding is secured? What information does the public require in order to make intelligent decisions? At what time should school-plant needs and actions be emphasized in the continuous program of school and community relationships?

The public relations program is not limited to securing public approval of a school-building project but covers all relationships between the school system and various publics in a community. The numerous and varied transactions between and among the school and community will tend to color local understanding of school-building needs. This is generally recognized as the local climate or background in which many individuals hold views on the educational program and influence each other. The community expectation in great measure creates the long-range educational program, as well as the emotional setting for a particular tax levy or bond election.

PUBLIC PARTICIPATION

The essence of successful community relations is a sound, businesslike approach to the task of supplying those educational services which the community wants. Experience with the democracy structure of local community government has demonstrated (1) the efficacy of the community to determine essential values and ultimate objectives and (2) the competence of the community to work cooperatively through its leaders and its experts toward desirable and highly constructive ends.

Public Interest and Understanding of the School Program. Community understanding of school-building needs is founded on an understanding of the whole educational program; therefore in practice the two cannot be divorced. School-building requirements in the mind of the public are but a passing phase or aspect of public educational service in general. Yet more is involved in a school-building program than simply to sustain an ongoing public service. The school-building program should not only perpetuate valid present practices but produce constructive new proposals. Such proposals are a vision of better practices to come. When fully explained—whether by words or architects' sketches or experience with problems or other means—constructive proposals are the focal point of community understanding and support.

CHAPTER 16

Relations with the Public

Those publics which never question the annual school budget often become aroused over a school-building program. Opposition may be to the proposed location, the size of the project, or particular aspects of plans, such as the swimming pool, auditorium, gymnasium, or features other than regular classrooms.

The success of a projected school-building program depends upon general public approval at many critical stages, particularly where authorization by vote of the people or approval by some other governmental agency is involved. Among the critical stages are site acquisition and development, budget adoption or a resolution to borrow funds, the approval of the general scope, preliminary plans, and the provisions of the final plans and specifications. Although not involved directly in some of these decisions, the public usually has elected the school board and always pays the taxes. Resentment at school-board decisions on various school-building problems can result in attitudes which are inimical to continued financial support for schools.

Public relations problems begin with the first identification of need. Unless general agreement is secured in the community concerning basic need, public relations are not likely to be satisfactory. The best way to start a sound public relations program is to invite broad public participation from the start in defining need, proposing a long-range program for meetiog the needs, and recommending priorities for various projects. At the very least this procedure assures a group of informed lay leaders who can help interpret proposed courses of action to others.

No matter what has been done previously, a school administration cannot proceed with particular projects without keeping the public informed. The people should be given the basic reasons for advancing the project at the time. They need information before referenda and elections.

1. Efforts to induce large numbers of citizens to visit the schools (rural, 62.9 per cent; urban, 83.4 per cent)

2. A parent-teacher (or home-and-school) council for the community as a whole (rural, 59.0 per cent; urban, 63.9 per cent)

3. Efforts on your part to develop in the school personnel the attitudes and skills of participation that promote good public relations for the school (rural, 52.9 per cent; urban, 69.4 per cent)

4. Maintenance of ready but orderly channels of communication for school news to the public (rural, 47.8 per cent; urban, 67.4 per cent)

5. Visitation of homes of pupils by teachers or other members of the school staff (rural, 47.7 per cent; urban, 55.4 per cent)

6. Maintenance of a "public-relations calendar" to provide for continuous and diversified contacts with the community, thru newspapers, radio and television, printed reports, letters to parents, and personal appearances (rural, 17.3 per cent; urban, 32.2 per cent)

7. Temporary joint committees of board members, teaching personnel, and laymen to study and to offer suggestions on specific school problems (rural, 17.8 per cent; urban, 26.2 per cent)

8. A general community council, in which the schools had a place along with other community agencies (rural, 10.5 per cent; urban, 17.1 per cent)

9. A continuing advisory committee of laymen (sponsored by the board of education) to study and to offer suggestions on school policies (rural, 10.1 per cent; urban, 10.4 per cent)

10. A general citizens' committee organized along the lines suggested by the National Citizens' Commission for the Public Schools (rural, 8.0 per cent; urban, 8.2 per cent)

Keeping the Public Informed at All Stages. A satisfactory program of public relations will begin before the initial school-board decision to investigate the question of school-building need and extend well after the project is completed and in full operation. Large cities may have a continuous school-building program, at least as far as modernization of plant is concerned. The earliest public information can be a conventional status report devoid of implications. The ultimate information may be on the utilization or on the product of a completed school plant.

The following list of topics for school publicity illustrates and suggests what information can be released in the process of building-project development.

CHECK LIST OF TOPICS FOR SCHOOL PUBLICITY

Prior to a survey

1. Official reports on nature of school population
2. Reports on curricular offerings and school services
3. Reports on visitation to other school systems or competitions
4. Birth rate in community and its implications for future enrollments

The criterion of sympathetic attention is important. An estimate of the number of babies that may be born usually makes front-page news. Translating school services into costs is acceptable since it gives the reader a sense of objectivity. Familiar elements in an information release, such as persons or events, will hold attention. Sketches and charts are useful as they contain an easily understood puzzle or problem. It requires more sustained attention to weigh an issue than to gain interest or sympathy. Most people have faith in the system of public education and appreciate being approached intellectually. The school authorities must be sensitive to the nature of popular reaction if they wish to obtain sympathetic attention to whatever publicity is released.

There are any number of information media that could conceivably be used and in many instances are: advertisements, news items, editorials and feature news articles, photographs, lectures, forums, radio scripts, television, newsreels, school commencements, exhibits, visiting days, industrial relation days, assemblies, curriculum materials, school government, displays, brochures, bulletins, report cards, posters, leaflets, questionnaires, business publications, school publications, car cards, financial statements, magazine articles, books, models, maps, sketches, graphics, study groups, correspondence, sociodramas, committees, carefully prepared technical reports. The necessity of using many media of information is to reach practically all the persons in the community.

Participatory Study and Planning. The necessity of community participation in studying needs for school facilities and planning a long-range school-building program was emphasized in Chapters 2 and 3. This material should be reviewed in formulating a program of public relations in connection with school-building problems. Such participation is essential for developing an active interest in the program.

Experience has shown that both the professional staff and the school board will plan more prudently if they have deliberately consulted with groups and organizations in the community. Certain patterns of participatory planning have proved especially effective and worth repeating. The individuals who will be concerned with a new school plant will make better use of it and hold it in higher esteem where they themselves have engaged in the planning processes. The public should know its school; it too has specific views to be offered and considered. The public's interests in the broadest sense are paramount. A judiciously planned school plant is an enduring community asset.

A national survey in 1950 by the American Association of School Administrators (Thirtieth Yearbook) found the following types of school-community-cooperation projects in operation that year. The percentage of rural and city superintendents conducting such projects is given for each of the ten patterns:

program as well. Customarily the school architect prepares a brochure for the school board on the project poposal.

Reaching All the Publics. Conveying to the general public the information required for intelligent decisions calls for careful selection of pivotal information. In this respect the citizens' groups afford a trial run of the administrator's judgment. Often they have more time to serve this function than the school board with its many responsibilities and activities. Many persons will have private interests in the school program. The young parent may want to know about the plans for a kindergarten. Others may inquire about provision for sports. These details are all information of interest to individuals. A group which should not be neglected is the absentee owners of taxable property. Where the absentee owner is a private individual, he may have a friendly interest in the community welfare. Occasionally the absentee owner is opposed to long-term bond commitments. In any event the facts and public interest in new proposals should be directly and fairly presented to absentee owners, as their good will is important.

Public participation is not to be construed as only the participation of a few energetic, interested individuals. Where there exists a citizens' committee, it will at best engage a limited number of persons and serve but a limited purpose. Participation, as a fundamental approach to community understanding, embraces many kinds of action. Some may be of the cracker-barrel, discussion type prompted perhaps by an item of news or publicity. Some may be the occasional contact of teacher or pupil with public opinion in the making. Some may be simply people listening and deciding at a local organization meeting.

It is generally agreed that all organized groups ought to be approached, although certain may prove hostile and others friendly. The independent voter and the families without children in school, who normally have little contact with the school program, are an important public to keep informed. Their attitudes often determine the outcome of a vote or an election.

The question as to emphasis that should be given the school-building program in publicity apart from other school and community relationships has always been debatable. Some advocate that a school-building program affords an extraordinary opportunity to unite the community in a reconsideration of the educational services from a very practical standpoint, and to generate a readiness to achieve greater purposes through the schools. Others claim that publicity about physical facilities should be kept in proportion with other objects of public support, such as teacher salaries, improved educational methods, teacher-parent cooperation, youth needs, and the like and that excessive emphasis on school-building programs can result in distrust, unnecessary meddling with representative au-

5. School-system evaluation
6. Unmet needs or services not being provided

During a Survey

1. Overcrowded conditions in schools
2. Community factors that are changing
3. Shortcomings of existing plant
4. Estimates of school-enrollment increases
5. Problems of school sites
6. Reports of public forums or civic groups considering school needs
7. Specialists employed by school board
8. Estimates of future space and facility demands

Public referendum or bond election

1. Proposals for meeting school-plant requirements
2. Provisions for hearings
3. Basis for financial plan
4. Procedures of the election
5. Where to obtain information

Progress of the project

1. Bids and costs
2. Inspection of work
3. Plans for occupancy when completed
4. Dedication ceremony
5. Financial success of the project budget

Completion of the project

1. Educational services offered
2. Success of the pupils
3. Community use of school plant
4. Features of the new plant
5. Recognition of leadership

Thus it is evident that a prepared plan for informing the public on any given school-plant project may very likely extend over a period of three to five years. Some school districts have found it advantageous to employ consultant aid in the preparation of a series of news releases or other printed materials to be released during the rather intensive campaign leading up to a public referendum or bond election—the chief purpose being to find a simple style of presentation that will be suitable for wide reading. News stories should possess accuracy, proximity, timeliness, conflict, and human interest. In most cities if the local press representatives and the school staff are accustomed to working together regularly on educational-program publicity, they can manage the building

bond issues no doubt has values in creating public interest in and support for schools which offset the administrative problems involved in bond campaigns and the occasional failure of the electorate to approve the financing of needed facilities. The bond elections for schools succeed most frequently where they are held separately from other elections. Legal requirements vary from the holding of town meetings to the granting of very general authorizations.

A school-bond campaign affords an opportunity to clarify misconceptions. It can be shown that because of wide differences among local units in their assessment policies, tax rates alone are meaningless in comparing the amounts of tax burden. The restricting effect of tax or debt limitations applied to existing assessed valuations can readily be demonstrated. Wherever opposition arises there is an opportunity to correct any distortion of the facts. The chief value of electorate control from the school administrator's viewpoint is the opportunity, both by information and by deliberation with citizen groups, to elevate the vision of the community as to what the schools can do.

For the taxpayer this is one of his few opportunities to say directly and specifically what action he prefers on the part of an agency of local government. He is especially concerned in this decision because of the power of education in his community. When the electorate reverses the position of the school authorities and defeats a bond issue proposal, it is no disgrace since a democratic public decision is the avowed purpose. Of several hundred bond elections held by school districts in 1950 and in 1951, about 89 per cent passed. There always will be, and probably should be, some last-minute reversals.

While the percentage of reversals has been small, one may inquire whether even fewer reversals would not have taken place had the school authorities a way of knowing public sentiment before setting the date for advertising an election. The traditional manner of testing public sentiment in politics is to observe the reactions of certain key individuals in the community. Many school districts, however, are making successful use of opinionnaire techniques, such as representative sample interviews which give a quite accurate test of the strength of public interest at any given time in support of school facilities. School authorities would feel much more secure if by citizens committees, hearings, and other forms of inquiry they could know the pulse of public reaction to alternative proposals or solutions of their building problems. A school board in this dilemma of uncertainty usually tends to be overcautious and thus deprives the public of an opportunity to vote on more defensible plans which could easily have passed were they offered for referendum.

Publicity for School-bond Elections. Plans must be made to gain favorable public attention to the election. Often it is possible to forecast quite

thority, and negative reactions. The authors observe that in the past the problem has not been absence of strong community pride in local school-building projects but a lack of public information about the functional character of the school plant as it relates to the educational program. The fault has not been too much but too little information.

It is true that school-building information has a systematic relationship to other kinds of public understanding of the school-district program. Often it is necessary to present the problem before the solution. Such public information as the following may mark the early stages of the school-building program: estimate and analysis of enrollment changes, effect of regional changes on the local community, need for new services or new instructional departments, hazards or obsolescence of existing plant, demand for new activities in the community and its schools, shifts of residential densities or of land usage or highway development or industrial location, and school-district evaluations.

An open-door policy to hear and consider a citizen's views as to "unmet needs" is one of the cornerstones of community understanding. This policy includes receiving the views of teachers and of pupils, as well as those of parents, pressure groups, civic organizations, businessmen, and neighborhood forums. It is a policy that may operate in public assemblies or simply in the daily routine of public contacts with school authorities. Odd though it may seem, the public often has to express its views on what it wants before it is receptive to constructive solutions; but such is the way that the open-door policy often works.

The school-building program itself must be essentially sound if it is to warrant public support. Where bond issues are rejected in public elections, the cause could be lack of harmony between the views of the electors and the school authorities on selection of site, or on an addition to a building versus a new building, or on attendance boundaries and transportation, or whether to provide first for elementary grades or high school grades, or the amount of debt to be created. Often the school authorities look upon a bond-issue election as a vote of confidence. Certainly if the school board is to retain public confidence, it must have consistently sound and acceptable plans.

REFERENDA AND ELECTIONS

All but a few states require a vote of the electorate on bond issues. After considering arguments for and against control by the electorate, Holmstedt[1] concluded that the direct participation of citizens in voting

[1] R. L. Johns and E. L. Morphet (eds.), *Problems and Issues in Public School Finance*, Bureau of Publications, Teachers College, Columbia University, New York, 1952, p. 312.

values would have to be equalized with those of Bryan, now 30 per cent or more higher than in College Station.

The A & M Consolidated School board sees the answer to this problem in a 14-room and auditorium high school plant, to be financed by $385,000 bond issue which will be voted on at a special election Saturday. Completion of this building, together with other minor improvements, will provide for the anticipated increase of 400 pupils during the next four years.

"We must face this situation now, for we already are crowded and conditions will be worse next year," Mr. Brown asserted. "Only by extraordinary administrative planning can double sessions be avoided next fall. Later this will be impossible. It appears obvious that the bond issue must pass so construction can start immediately and the new building be ready for occupancy by the Fall of 1954."

With the improvement in use of public relations media by school districts, there has been more and more public interest in the school bulletin and brochure that the school system delivers directly to the parents and citizens. Brochures of various types prepared by architects and other school specialists are used in connection with most major school-construction projects and are usually timed for release in connection with an event of major importance like the presentation of a formal school-building-survey report, or announcement of the date for a bond election, or the dedication of a new building.

Exhibits or models may be shown at public occasions to keep the school-building program before the public. Maps and charts are good visual aids and school-survey specialists generally include them in their reports for publicity. The achievement of deliberative judgment is somewhat of an art; the school authorities should allow time for a good program of public understanding to materialize. This is true not alone because of the public's legal power to approve or disapprove bond sales or tax levies, but because of the ultimate, long-range necessity of achieving public support if the new school plant is to serve its intended purpose completely, efficiently, and economically.

LEGAL RELATIONSHIPS

The legal relations which local school units have with state agencies and other local units of government afford an opportunity for applying sound concepts of public relations. School-building projects often are delayed by failure to obtain necessary authorizations or approvals from such agencies. Sometimes they are held up indefinitely.

The school authorities should begin to discuss their plans with such agencies well in advance of seeking formal action. In the course of such

accurately the amount of negative vote (resulting probably from conditions quite apart from educational issues) and the objective of the school authorities must be to bring out a larger affirmative vote. One must not underestimate the tremendous influence of personal appearances and conversation. The school board and staff are primary agents. The architect and educational consultant can also make effective personal contacts on occasion. The administrative staff in particular is expected to explain the building program and be a resource of reliable information to public meetings, forums, community organizations, and news reporters.

The more newspaper publicity there is, especially editorial support, the more likely the issue is to be approved. Adverse newspaper publicity should be avoided. The newspapers actually have no obligation to publish school information, but generally they are cooperative in constructive civic affairs. News items have their own order of timing, and school-building information can be released accordingly as reports to the board of education, as a phase of the school budget, or in connection with a meeting or event. News reporters like a series of articles where reader interest can be sustained to look for the next installment.

Following is one of a series of news articles prepared by school authorities for release prior to a successful bond election for a consolidated school:

> Increase in the number of children crowding our schools beyond capacity is not a temporary phenomenon, but will continue even if the low birth rate of the thirties should recur, according to Ewing Brown, president of the A & M Consolidated School Board (College Station, Texas).
>
> His statement was based on analysis of local population trends, and on a 1952 research report "School Enrollment Begins Long Climb" by N. L. Englehardt, Jr., of Engelhardt and Leggett.
>
> "The trend of population growth of Bryan has been toward College Station and an increasing number of Bryan business and professional men are making their home in our community," Mr. Brown said. "Good schools will attract new residents. Poor schools will drive them away. Expert analysis shows that our school facilities, already taxed to capacity, will be overcrowded in the elementary grades by next fall. Even with no growth in population, high school facilities will be inadequate within two years, the minimum time in which a new school can be built."
>
> If the A & M Consolidated school plant is not expanded immediately there will be no place for pupils to go. The only answer would be double-shift classes, which have proved unsatisfactory to pupils and teachers alike. Transferring to Bryan would be no solution, A & M board members point out, since the school system there already is crowded. Before Stephen F. Austin High School could absorb students from College Station, major expansion there would be necessary. If this burden were shared fairly by College Station residents, local property

(10) umbrella roof. The brochure features teamwork of experts, laymen, and staff who planned the esthetic, environmental, and functional aspects of the plant. There has been an increasing tendency for school-architectural firms to supply interpretive literature of this nature. It is good business for all concerned to advertise the amount of research, the educational advantages, and the cost savings that go into a superior building plan.

Dedication Ceremonies. Large public buildings traditionally are dedicated with public ceremony. These ceremonial events are appreciated by citizens of the community who are thus invited to meet the personages responsible for executing the project in which public revenues have been invested and to inspect its quality throughout. As stated by Dr. Don L. Essex of the New York State Division of School Buildings and Grounds:[3]

> Education is the largest and most important enterprise in most communities. The school plant means more to more people than any other building. It also represents a major financial outlay which is made jointly by all local taxpayers. Because of these facts and because of the interest all residents have in the education of the children it is natural that the residents should wish to see what has been provided.
>
> Arrangements should be made for public inspection of any new school building as soon after its completion as possible. Plans should be developed carefully with appropriate guides and speakers who can show and explain the various features of the buildings. This open house or inspection may be in connection with formal dedication ceremonies.

Traditionally, the school dedication has been an occasion for disseminating illustrated brochures that invite public understanding, confidence, and pride. These descriptive brochures are a test not only of the architect's engineering judgment but of the combined ability of the staff to interpret the school as a community institution. The school administrator can well afford to give his best intelligence to the clarity and outlook of his concluding published report on the project.

Future Planning. Shifts of child population and premature educational obsolescence of the school plant have been two great problems in the history of providing physical facilities. Fortunately, as Grossnickle has shown,[4] the cost of the physical plant in the long-term view amounts on the average to only about fourteen per cent of the cost of the program for current purposes. It is now recognized that any given school-plant

[3] *School Building Projects—A Guide to Administrative Procedures*, New York State Education Department, Albany, N.Y., 1950, p. 20.

[4] F. E. Grossnickle, *Capital Outlay in Relation to a State's Minimum Educational Program*, Bureau of Publications, Teachers College, Columbia University, New York, 1931.

preliminary contacts it is possible to discover possible objections, to correct misunderstandings, to modify plans where necessary, and to present further facts to support what appears to be the best course of action.

The same principles which govern relations with groups within the community apply to relationships with other governmental agencies. Unless the school system has been able to present a strong case for its proposals and has developed friendly working relationships, such agencies may become the focal point for community groups which are opposed to what the school system is striving to accomplish.

Even where legal relationships with other local governments are not fixed by law and the school government is fiscally independent of local municipal governments, cooperative study and planning, exchange of pertinent information, and good relationships generally are essential. The school system cannot afford to ignore other governmental needs in the community. Other governmental agencies serving the same community cannot plan wisely without knowing the future plans of the school system.

CONTINUITY IN PUBLIC RELATIONS

Subsequent to the community approval of a bond issue, there should be continued public relations aimed at full realization of, efficiency in, and esteem for the school facility or facilities being advanced.

Published Reports. Probably the very minimum published report growing out of a building project would be that of an audit of the capital-improvement fund, submitted as a supplementary schedule of the annual financial audit of the district. Actually from sundry reports to the state and other memoranda, there will emerge quantities of interesting data on such subjects as plant capacity, cost per cubic or square foot, total cost of the project, educational services added, date of occupancy, and plans for placing the building in use. These data will find their way into daily newspaper articles. As a matter of good public relations the progress of a school-building project should be reported to the press periodically and not left entirely to the formal summation of accomplished facts at the completion.

An interesting brochure demonstrating how the building plan itself may be interpreted to the lay reader was recently distributed by the Port Arthur school district.[2] With sketches and brief explanations, this brochure discusses the new Sam Houston Elementary School with respect to (1) plan arrangement, (2) teaching walls, (3) natural lighting, (4) low cubage, (5) movable cabinets, (6) natural ventilation, (7) easy upkeep, (8) covered activity area, (9) four-way vision (glass areas), and

[2] Published by Board of Education, Port Arthur, Tex.

early neglect. Unfortunately one discovers too many new school plants a few years after occupancy marred by unsightly grounds, broken windows, and even the debris of construction not entirely cleared away.

A school building is planned for long and constructive service to the community, and the best intelligence of architects, engineers, and educators is expressed in its design. A good school building is a thing of beauty, but it is also made to work in. For many years the desks and walls should not be disfigured by vandalism. On the other hand, exhibits are to be encouraged: one architect designed walls so that thumbtacks could be used anywhere. A school building is to be worked with. Teachers and pupils should understand the comfort, safety, and educational aids of the building and plan together how to use them.

SUMMARY

The process by which a community gains understanding of potentialities in the educational system, contributes the best thinking of all its citizens, broadens its outlook for the public welfare, analyzes its resources, pledges its support, and interprets through constructive plans its long-term objectives is known as community participation.

Each school board representing a local school district operates in an atmosphere of influences; it employs administrative and specialist counsel serving as professional leaders and executives; it is surrounded by children, teachers, parents, and nonparents of the community who are concerned in the ultimate provisions and actions; often it must seek approval for major decisions such as bond issues through legal referenda. The legislative and policy-determination function makes the board sensitive and responsive to these influences.

Intelligent participation of the community or publics begins with an understanding of all facts and issues. Educational leadership is expected to coordinate such participation through a clear-cut public relations program. Many media and types of information over a period of three to five years will be required to reach fully all the publics in the course of a school-building program. But the program itself must be essentially sound if it is to warrant public confidence.

Public referenda are commonly required in the event of long-term bond issues. These will entail a special publicity campaign. Both personal contacts and continual newspaper releases are effective means of persuasion prior to such elections. Many school districts today prepare technical brochures as an independent means of public information.

Obviously to have a sound program of public relations one must seek to keep the public informed at all stages, not alone for election purposes but to attain the ultimate objectives. The policies, the future plans, the plant features, the research, the financial audit, the initial occupancy, the educational methods are all items of public information and interest. Public esteem in future years constitutes a major determining factor in the proper upkeep and functional usage of any new plant facility.

project is but a temporary solution in an ever-evolving and growing program of school-district services.

While planning and building today's schools, the long-range-policy actions of the school district must make provision for population trends, alternative future utilization of the plant, flexibility and expansion to meet curriculum and program changes, new demands of the community on the school district reflected in the scope of services and program, and reserve of a revenue leeway, both local and state, to care reasonably for future stages in the school-plant development.

There is in consequence a notable trend away from monumental concepts of school building and toward seeking creative solutions to basic educational problems. In part the modern emphasis is accomplished by larger school sites, more careful surveys of requirements, advance provisions for ease of alteration and expansion of new buildings, and shorter term of bond issues. In part it is sought by cooperative planning, counsel of trained specialists, intensified research and experimentation, and the best possible foresight in engineering buildings for efficient utilization.

No doubt, obsolescence will be an ever-present issue in a society characterized by rapidly changing technology. A school designed for natural ventilation might prove to be inappropriate for mechanical air conditioning; or an elementary school divided into isolated classroom units might be found nonadaptable to a workshop method of instruction where two or three teachers combine their skills and resources. But at least modern schools are planned for alternative utilization to an extent not at all characteristic of schools built twenty-five or fifty years ago. Long-range planning is now evident both in the educator's specifications and in the modern architect's method of school-plant design.

Policies upon Initial Occupancy. Sufficient time should be reserved for complete instruction and for total staff planning in regard to the best use of the new school building and facilities. All the custodians must be made thoroughly familiar with mechanical devices and with controls and their operation. Preferably the head custodian should be freed of other duties to spend ample time in the building during its construction stages, especially when heating, plumbing, electrical, and other operational fixtures are being installed. Custodians also need to understand the effect as well as the proper scheduling of various cleaning operations; and they should know where to expect periodic upkeep.

Likewise the children and community can be instructed and encouraged to plan cooperatively. Sometimes the new plant and grounds are not yet finished at the time of initial occupancy. To watch and participate in the cultivation of foliage and installation of various extras will give the children a strong feeling of possession. A building off to a good start, with full appreciation of the plans, is much less likely to fall into

Passage of School Bond Issues," *American School Boord Journal*, 104:54, January, 1942.

Elzay, Jack: "Are Schools Prepared for Lay Participation?" *Americon School Board Journol*, 125:27–29, September, 1952.

Fine, Benjamin, and Vivienne Anderson: *The School Administrotor and the Press*, Arthur C. Croft Publications, New London, Conn., 1956.

Fogarty, J. E.: "Community Action—The Only Way," *School Executive*, 77:45–47, December, 1957.

Gallup, George: *A Guide to Public Opinion Polls*, Princeton University Press, Princeton, N.J., 1944.

Harlow, Rex F., and Marvin M. Black: *Practicol Public Relations*, Harper & Brothers, New York, 1952.

Moehlman, Arthur B., and James A. van Zwoll: *School Public Relotions*, Appleton-Century-Crofts, Inc., New York, 1957.

National Education Association: *Winning School Support ot the Polls*, No. 7, Washington, 1947.

Nicholas, L. N., and F. J. Gottfried: "The Citizens Voted Yes Because They Knew the Facts," *School Executive*, 72:50–52, June, 1953.

Nielander, William A., and Raymond W. Miller: *Public Relations*, The Ronald Press Company, New York, 1951.

Postley, M. G.: "Public Relations for Architects," *The American School and University*, 23:79–82, 1951.

Reeder, Ward G.: *Compoigns for School Taxes*, The Macmillan Company, New York, 1946.

———: *An Introduction to Public-school Relotions*, The Macmillan Company, New York, 1953.

Strevell, Wallace H.: *Approising Public Attitudes toword Public Schools*, Gulf School Research Development Association, University of Houston, Houston, Tex., 1954.

Thomas, Maurice J.: *Improving Public Educotion through Citizen Porticipotion*, University of Pittsburgh Press, Pittsburgh, Pa., 1954.

Whitelaw, John B.: *The School ond Its Community*, University of Chicago Press, Chicago, 1940.

Wood, L. K.: "School Bond Campaign as a Public Relations Opportunity," *American School Board Journal*, 120:26, February, 1950.

DISCUSSION PROBLEMS

1. Prepare a schedule for the publicity program relating to a school-bond election. In this schedule indicate the probable timing of actions and the personnel assigned.

2. Outline some of the information that should generally be given the school personnel and pupils in the course of a long-range school-building program; and in relation to referenda or elections.

3. Is a public relations program more concerned with agreement on long-range plans or the advancement of particular projects?

4. Brochures and other printed descriptions of school-building programs are fairly common. Make a collection of these and classify them according to their intended use: general background and plans, dedication programs, announcement of elections, etc. Which seem superior in terms of straightforwardly informing the public? What techniques have been used to secure interested and favorable attention to the issues involved?

5. How may the school administrator's staff be organized to produce material that has public relations value? Will regular staff reports to the school board serve this purpose, or should special skills in the art of publicity be engaged?

6. Compare the use of local newspapers with that of special brochures published by the school system as media of reaching the publics in a bond campaign. Besides informing the public and inviting discussion, what steps must be taken to assure a favorable vote at the polls?

7. Should the school superintendent or the school board assume responsibility for relationships with other local units of government?

8. This chapter has stressed that school-building public relations should have satisfactory results and that it should be a part of the continuous public relations program of the school system. Give several examples of how this is technically accomplished.

RELATED READINGS

American Association of School Administrators: *Public Relations for America's Schools*, Twenty-eighth Yearbook, Washington, 1950.

Anderson, Vivienne: "Press Conferences," *School Executive*, 69:39, March, 1950.

Brownell, Clifford L., Leo Ganz, and Tufie Z. Maroon: *Public Relations in Education*, McGraw-Hill Book Company, Inc., New York, 1955.

Canfield, L. R.: "Explaining Building Needs to the Public Graphically," *American School Board Journal*, 111:37–38, August, 1945.

Citizens Study Their Schools: The Board of Education, Danville, Ill., 1949.

Cutlip, Scott M., and Allen H. Center: *Effective Public Relations*, Prentice-Hall, Inc., Englewood Cliffs, N.J., 1952.

Dreiman, David B.: *How to Get Better Schools*, Harper & Brothers, New York, 1956.

Edmiston, Robert W., and James R. Holcomb: "Some Factors Favoring the

occasion as an expert witness or arbitrator. The most common capacity is that of executive architect.

Executive Architect. Major professional services which may be expected of the executive architect are as follows:

Preliminary studies of the problem. The first stage of the architect's work is one of consultation with his client and analysis of the requirements and conditions of the project. He may counsel the school board on selection of site and on choice of approach to the preparation of educational specifications. When he has an outline of the general program clearly in mind, he prepares diagram studies establishing a solution for (1) the space problems and (2) the structure and design.

Preliminary drawings and outline specifications; decisions on basic design. The architect then completes the general program in detail, makes an analysis of environmental controls, and submits his basic drawings for approval. Decisions must be made on the structural system, and the architect submits his recommendations on building materials and equipment. A tentative outline of specifications is prepared and discussed.

Working drawings, final specifications, and detail drawings. The architect next develops his detail plans and elevations. He completes the engineering of the structural system. He completes the engineering of heating, ventilating, and electrical systems. He prepares large-scale construction drawings. He prepares plans of cabinet work. He writes the specifications for all construction phases, drafts the form of proposals, and manages the advertising for bids.

Business management and control. The architect is responsible for counseling his client on the taking of bids and on their acceptance. He drafts the form of contracts as to both general conditions (refer to Chapter 19) and the agreement. He oversees the keeping of accounts and issuing of change orders. The architect has general responsibility for the business administration incident to the conduct of the work. The architect issues certificates for payments to contractors and submits a project-acceptance report on final inspection.

Supervision of the work. Besides making his own inspections, the architect has general administration of the superintendence of the project. He oversees staking out of the building and work during construction, checks the contractor's shop drawings, and counsels with the contractor on proper execution of the work. An architect's supervision is no substitute either for a clerk-of-the-works or for an able and conscientious contractor. Provision for continuous superintendence is the owner's responsibility. The architect, however, makes technical inspections prior to certifying the school board's payments to the contractor.

Other Services of an Architect's Office. *Legal.* The architect may request from the school administrator instructions through legal counsel

CHAPTER 17

Architectural Services

The services of an architect cannot be introduced too soon in the process of providing school facilities. His background and experience can be helpful on program planning, site selection, and determining the general scope of the project. Once the decision is made to advance a project, his services are required to plan for site development and in translating educational specifications into preliminary plans for consideration of the school administrator and the school board. During this stage it is necessary for the educational staff and the architect to work in close cooperation, allowing sufficient opportunity for the architect to observe community elements and needs. Once the preliminary plans are approved, the preparation of the final plans and specifications which follows is a highly technical job in which the architect and various engineers must work together.

The practice of architecture is now regulated by law in all states. Registration or licensing of architects is personal. Through their professional societies, particularly the American Institute of Architects, founded in 1857, and its state chapters, architects have standardized the definition of their services, the format of numerous documents comprising contracts with the owner, and the organization of an architect's office. Respective responsibilities of the architect, various engineering specialists, and the contractors must be understood by a school administrator charged with direction of a school-plant program. The superintendent should recommend procedures for selecting the architect and engineers where these are not provided by the architect's office.

PROFESSIONAL SERVICES OF AN ARCHITECT

An architect may be employed in sundry capacities: executive architect, supervising architect, consulting architect, associate architect, or on

executive architect to plan each independent school campus as an individual project, starting from its site.

Advisor to the local unit. The architect's virtue is in his advice and counsel, and his services are not limited solely to drawings, specifications, and contract documents. School boards underestimate the architect's services if they contract for only a portion of his production ability, or let a "practical contractor" build their school, or show the architect an existing building and direct him to plan one like it. The architect renders full service when he is in on the program from its early beginning, is given every encouragement, and has a fair opportunity in return for his small fraction of the total cost to save the owner in many respects a sum much larger than his fee. The architect can render a valuable service as consultant in the basic survey of the need and capacity to solve the need, and the cooperative planning essential to bringing out an articulate, judicious concept of the scope and character of the need to be met.

The architect belongs, therefore, in the policy-making group. The American Association of School Administrators has stated: [1] "The training and apprenticeship required of architects, the self-imposed standards of the profession, and the heavy responsibilities normally involved conspire to produce men of integrity, business ability, and artistic and technical competence."

Instruct the user of the plant. Bursch and Reid [2] have observed that in designing a school plant the architect has given many ideas final form and knows their use possibilities. Among these design ideas are illumination control; arrangement and rearrangement of furniture; operation of all the mechanical systems, such as temperature controls, heating and ventilating, fixtures, electrical controls, communication system, and fire-protection apparatus; how the utility outlets fit possible arrangements of special equipment; reasons for choice of materials, finishes, and colors; future plans, such as alteration and expansion possibilities; spaces for installing drapery tracks, shades, or apparatus; and other special designs and solutions. It is recommended that the architect, before he leaves the job, explain all these details to the board, administrators, teachers, and custodians. This is an obvious obligation; yet instances are all too common where the users of complex, modern school plants show lack of instruction as to the why and how of the special features of their buildings.

Completion property record. The architect will leave a lasting impression if he would assist the school business office with its continuing

[1] *American School Buildings*, Twenty-seventh Yearbook of the American Association of School Administrators, Washington, 1949, p. 132.

[2] Charles W. Bursch and John L. Reid, *You Want to Build a School?* Reinhold Publishing Corporation, New York, 1947, 112 pp.

as to any laws to which reference should be made in documents or to which the procedure on bidding and letting must conform, or he may have conducted this legal research himself on behalf of the school board. It may fall to the architect to submit sketches and working drawings to art commissions, planning commissions, and state approving agencies, or to prepare applications for grants and approvals on behalf of the school board.

Business procedures. Among the detailed laws to be considered in specifications and contracts may be found provisions with respect to authorization and validity, advertising for bids, deposit of bid bond or certified check, taking separate bids and letting contracts to certain trades separately, basis of award, form of contract, surety bonds, mechanic's liens, workmen's compensation, social security, minimum-wage laws, alien labor, number of hours constituting a day's work, nepotism, liability, and municipal or state building codes. It is the duty of the architect to design his building in conformity with law, or appeal for relief to proper authorities. The architect may have liability for conformity with these laws. It is his duty to advise the school board on business procedures.

An expeditor. The school architect should be the expeditor of the project. Liberal time ought to be allowed for each stage of the planning because of the importance of using the best thought and engineering skill, and so that no stage will be slighted in the process. Where time and money can be saved, the school board looks to the architect to be an efficient executive in their interests. The architect from his experience can provide an effective time schedule to be followed through the survey, planning, business, and construction steps. Serious consideration has been given to basing the architect's remuneration for public-works projects on a cost-plus basis so that the architect would serve as a full executive and the public body would have a financial stake in its own prompt action.

Research services. Architectural offices in one way and another have very constructive programs of research and planning. The school architect has devoted years of training to his work and is expected to possess the latest information on materials, construction methods, design, and business practices. Some firms have done demonstrable research in school design and equipment. Some firms have an unusually complete team of experts for the work. But the individual architect may have his own outstanding contribution to make in the basic plan of the building and its related environs.

Most modern architects want to begin with a study of the purpose and setting of the proposed structure. Thus while a large district or city may require a supervising architect, it is found expedient to engage an

the other hand, will produce high cost not only in terms of the amount of space provided for a given outlay but also in terms of utility of the space and ultimate costs in terms of operation and maintenance. The school board must determine the architect's temperamental inclination to adapt architectural elements to educational goals. In searching for the best available architect from the standpoint of economical, functional design, the school-board members must gamble somewhat, but they can watch for tangible clues of his efficiency and creative powers.

Should the school board consider an experienced or an inexperienced architect? The otherwise-qualified architect who is inexperienced in school architecture may consider it a challenge and produce a superior plan. The experienced architect has the benefit of his past performance and research background, but he might be tempted to rework a ready-made plan instead of creating a specific solution to the district's problems. An architect inexperienced with school design can be judged by his record and reputation in other types of architectural work and the facilities commanded by his office for a large public project.

Should the school board consider distant architectural offices? There is good cause to engage an architectural firm of national reputation if it will produce an exceptionally brilliant result; but any building program should have full and wholehearted cooperation of the school architect with the local board, enlarged lay committee, school staff, and administrator, and furthermore there should be unstinting supervision of the contractors during construction of a project. The accessibility of an architectural office is sometimes improved by coordination with a local architectural firm.

Does the questionnaire form of inquiry favor the large architectural firm? The large firm naturally can offer a team of experts who have attained a reputation for their work and are equipped to deal with many contingencies; but a small architectural office led by a talented architect with the administrative drive can rather easily expand to cover all the requisite engineering and business functions. The small architectural firm might give the program more continuous individual attention.

Many of the procedures followed in employing school architects are not such as to assure selection of the best service. Residence in the community, personal acquaintance with the superintendent or school-board members, entertainment provided at conventions, elaborate displays of pictures and slides, the employment of a well-known educator to make personal contacts, submission of sketches, political pressures, publicity, and other forms of salesmanship can be used by good or bad architects to obtain contracts. Indeed in such a highly complicated field the superintendent should anticipate and expect to be confronted with such things. The only way by which he can protect the interests of his

property responsibilities. Perhaps the architect is hesitant to intrude, but if invited by the school board, he generally will be most interested to respond. He can aid materially in setting up adequate permanent records of the project and in scheduling maintenance of the new school plant. He could advise the school board on treatment of finishes, proper painting schedules, custodial methods, and care of all working parts of equipment. He could explain the various guarantees and help to anticipate such periodic repairs as occur with roofs, stonework, ground slab, downspouts, flooring, wainscot, plumbing, lighting fixtures, air conditioners, windows, and so on.

Notes could be filed on the future use of plans and specifications for replacement and repair details. If a landscaping service was included, he could leave long-term instructions for plot utilization, care of foliage, and future planting. Certainly the rich experience of the architect should not be lost through reticence or neglect to achieve a full and complete transition from the architect's achieved design to an operating educational program. And the architect will have gained durable friendships and access to future contacts with the community.

SELECTION OF THE ARCHITECT

A good architect must possess technical knowledge and skill, but this is not enough. He has to be a good administrator, able to work with the engineers, educators, and technicians involved in planning, with contractors and inspectors during construction, with legal counsel and school boards in dealing with the many problems which arise during planning and construction, and with citizen groups where they are participating. He must possess creativity, imagination, or inventiveness in solving new or unique problems. He has to be honest, ethical, and conscientious. He has to be a good business manager in handling the many financial and business details inherent in the nature of his work.

Good architectural service in terms of technical competence, personality, executive ability, demonstrated performance, and other relevant elements is cheaper than mediocre service, although the fee may appear to be the same. Few matters are as important as the right architectural design to gain greatest utility for the money expended, and the school board will have to rely mainly on the architect's skill for the outcome. The good architect through efficient planning, the result of thorough study and hard work, will produce an efficient, economical design and working drawings and specifications which keep costs at a minimum.

As a result he can provide more space for the same outlay or he can reduce the cost of the project. His plans and careful inspection of construction will keep future operating costs low. The poor architect, on

firms which are not interested in the project, or firms which might not be able to handle the particular project or projects. The holding of a local competition and the sending of questionnaires to an unselected large list of architects would be wasteful of time both for the architects and the school administrator.

The fourth step is to outline the best procedures for finally selecting the architect who meets the adopted job specifications. Among the procedures which have been used for this purpose are formal inquiries, visits, and correspondence with other school systems for which the architect has done work. If this procedure is followed, the school superintendent should know all the school systems for which the architect has worked, not just those which he is willing to mention. A list of school systems for which an architect has done work often can be obtained from a state education department. Such a preliminary survey will narrow the list of possible firms still further by eliminating those who have generally left a bad record of delays, faulty supervision, unfinished work, complaints about the utility of the facility, extra costs, problems of operation and maintenance, contract disputes, and similar objections.

The fifth step, which is most crucial of all and often neglected because it involves some expense, is the actual inspection of completed projects. If this step is limited to a small, highly selected list and is conducted by persons familiar with school construction, it can be most helpful in the final selection. It affords an opportunity to judge the quality of design and workmanship and to evaluate the personal attributes of the architect in his dealings with others.

There should be provision for interviews with the best-qualified individuals as the sixth and last step before final action is taken. Each one who is to be interviewed should be given an appointment with the superintendent and the school board. Ample time should be allowed for such interviews. They should be so scheduled that others are not kept waiting. Questions to be asked should be prepared in advance and should be for a specific purpose related to the job specifications. No question should be asked about the work of competitors unless for purposes of testing the ethics of the person being interviewed. The architect should be told that he will be informed concerning the final selection after all interviews are completed.

The school board must now apply the adopted criteria in making its final decision. Board members can settle in their minds that the architect to be engaged is a capable individual and that he is able to work harmoniously with the school officials and district. They can assure themselves that his organization and financial backing will enable him to proceed on a suitable time schedule with clearly drawn plans, reliable estimates, modern specifications, specialized engineering, acceptable bidding

community is to establish in advance the procedures which should be followed in selecting the architect and to get them adopted by the board long before it becomes known that an architect is to be employed.

Six Steps in Choosing an Architect. On the usual project the architect will be paid a gross fee equal to what the average school superintendent would earn over a period of years. The first step is to formulate qualifications for the architect which will justify the fee to be paid. This statement should be formally adopted by the school board before proceeding any further. The minimum qualities to be included in such a list are these: personal traits (ability to cooperate, ability to get things done, ability to arbitrate disputes, ability to interpret his work to others), technical performance (size of staff, outstanding designs for others, satisfaction with work done for others, educational background, past experience), integrity (adherence to code of ethics of profession, reliance upon past performance rather than upon personal influence, politics, publicity, or other similar practices), economy (discussed in Chapter 18), and availability for personal contact and close supervision of the project or projects (if the firm is carrying on a large volume of work or if it is located remote from the locality, what provisions will be made to give the locality the direct service it needs?).

The second step is to familiarize the school board with the code of ethics of the American Institute of Architects which condemns some of the practices suggested above, such as submitting ready-made designs, free sketches and estimates, exaggerated advertising, or misleading publicity. The school board should be advised that an architect who violates the ethics of his own profession is not likely to be ethical in his dealings with school systems. Furthermore, the code of practice itself is not so tightly drawn as to prohibit all competition not based upon demonstrated performance.

The third step is to obtain a list of architects from which the selection may be made. Among the sources from which such a selected list may be obtained are the state education department, the school-building consultant employed by a school system, the lists of winners of national awards published in school-administration journals, the projects described in articles in such journals, contacts with other school systems, and the state society of architects. It is common practice to secure data by formal inquiry, and a standardized questionnaire for use in contacting architectural firms has been developed by the National Council on Schoolhouse Construction.[3] Data obtained on this basis can be used to eliminate

[3] *Standard Form of Questionnaire for Selection of Architects for School Building Projects*, National Council on Schoolhouse Construction, Peabody College, Nashville, Tenn., and the American Institute of Architects, Washington. The questionnaire form may be purchased in quantity from either source.

being different for residences, industrial plants, churches, memorials, monuments, hospitals, office buildings, etc., but for schools of conventional type the basic rate for an executive architect usually is 6 per cent of construction costs. What services the school district may expect for this fee, however, will differ considerably according to the architect's ability and the agreements made in his contract. It should be plainly stated in the agreement whether the scope of work includes the plot plan for development of grounds and landscaping, the specifications for furniture and portable equipment, and other related features.

A fee-plus-cost system of compensating architects is considered quite flexible since it enables the architect to advise the owner on investment of his money without having professional remuneration affected by the final amount actually expended. A school board may wish to have the architect's counsel on furniture, equipment, out-of-door facilities, public relations brochures, maintenance work, renovation of old buildings, future site selection, and many other matters beyond the erection of new school buildings. Since it is difficult to anticipate all these demands in a basic contract rate, the American Institute of Architects has developed various model forms of agreement with an architect to cover special arrangements of work.

The team of planners on a truly functional school-plant project consists of many specialists or specialties: research, programming, plan development and production, site planning, specification writing, construction supervision, legal documents, cost analysis, color design, structural engineering, heating and plumbing engineering, lighting, ventilation, and equipment. Most architectural firms subcontract one or more of these specialities. Modern construction calls for the highly specialized services of engineers, structural, heating and ventilating, electrical, and so on. Since the owner often does not understand the extent of these matters, it should appear clearly in the stipulated agreement whether the architect or the owner shall pay the engineering fees.

Obviously the duties of an architect control the amount of his fee. Where several architects have to be employed simultaneously or successively it is customary to retain a *supervising architect* in order to achieve harmony of purpose and design. This helps avoid opportunism in choice of sites, materials, and styles of architecture. A supervising architect or the head of a bureau of design and inspection can be paid a regular salary. Large cities commonly retain architects in a supervisory or consultant capacity. New York City is an example of a school district with a bureau of full-time architects and engineers for inspection duties, rehabilitation problems, studies of labor and material market, and other projects essential to maintaining a large school plant in a major city.

Smaller school systems may have their architects plan and estimate

instructions, and supervision. They can verify his reputation as an executive who coordinates the contractors and services essential to the highly specialized development of a school plant. They can judge his competence in utilization of school site, choosing appropriate building style, and planning for economy, efficiency, and durability. Those interviewed should not be kept waiting for the announcement. Both the successful firm and those not selected should be notified, preferably in writing, after the decision is made.

CONTRACT WITH THE ARCHITECT

Some school districts enumerate in their agreement with the architect all of the specific services that the architect shall render. However, this purpose can be achieved as well in exchanges of correspondence. The formal agreement with the architect needs to be definitive as to the basis of fee, or cost-plus payment, to be paid for the services, as to the time schedule of the work and payments, and as to the termination of the agreement, as well as some specific duties to be expected of the architect. The American Institute of Architects supplies a model form of agreement between the school district and school architect.[4]

Capacity of Architectural Firm. An architect is employed on a knowledge of the scope and skill of his office and on the confidence in his reputation and integrity. He brings to the work his personality, just as does the superintendent of schools, and this cannot be detailed very well in an agreement. A growing practice has been for architectural firms interested in cultivating school business to prepare a prospectus representing the services and skills of their architectural offices. This has led school boards to become acquainted with and to make increasing use of their full potential services. Since the agreement with an architect has its admitted limitations, the school board is entitled to receive such a prospectus, including evidence of technical skill in planning the total school site, landscaping details, allowance for future development, drives and walks, playfields, field houses, parking areas, and campus concepts of site utilization; also, a realistic approach to selection and installation of portable equipment and furniture that ties in closely with spacial relationships, and to cabinet work, utilities, lighting, and circulation; and, as has been mentioned, the capacity of the architect of a complex school plant to serve as agent for the school board in representing its interests before various reviewing bodies and authorities.

Compensation of Architect. The compensation for normal architectural service as outlined above is customarily based on a percentage of the cost of the work. The rate varies according to the character of the work,

[4] Contract forms may be purchased from the American Institute of Architects.

of property, then give depth and size of sewer and direction of flow as found in manhole nearest in each direction. If any of these data are unobtainable, state at least whether such mains exist or not in each street.

3. Indicate width of traveled ways, sidewalks, and planting-strips.

Interior features

Indicate all interior roads, drives, walks, cultivated areas, fences, walls, pits, quarries, hedges, large boulders, ditches, culverts, catch-basins, water-courses, ponds, swamps, springs, wells, cisterns, hydrants, lamp-posts, electric-wire poles, outlines of all buildings, etc. Furnish full information as to all water-, gas-, and sewer pipes and electric-supply lines, or make note if any exist.

Location of trees and foliage

1. Indicate on map, by sketch, freehand line, approximate extent of overhang of branches of isolated trees, of masses of trees and high bushes. Show all isolated trees over 3 inches in diameter of trunk.

2. Show all principal trees along fence-lines.

Elevations

1. Give figure of elevation to nearest tenth of a foot of normal surface of water in ponds, brooks, and swamps.

2. At bottom of every culvert, on top of retaining walls, at grade crossings or railroad, and at overhead or undercrossing bridges, as well as established grades at curbs and building lines.

3. Of first floor and of basement or cellar floor of all buildings and of the ground at their entrances and at foot of steps connected with same.

4. At top and bottom of all outside flights of steps.

5. Along lines of all roads bounding upon, leading to, or within the property, with sufficient frequency to indicate gradients.

6. At base of all surveyed trees.

7. If there be buildings adjoining the site, give their floor-levels.

Contours

Show contour lines for each foot of elevation, except on very steep banks, where they may be for each 5 feet of elevation.

Datum

From the official datum establish bench-marks for use in running levels.

Easements

Clearly and fully describe all rights, restrictions, easements, etc., of the Owner's property, or any other facts relative to it that may affect the Architect's work.

Party walls

Show all party walls, their location, thickness, height and variation from plumb-lines.

modernization of substandard buildings, or they can depend upon reliable building contractors and local engineers except when engaged in a new plant project. In some states the architect's plans and specifications for remodeling or new construction have to be checked by a structural engineer for compliance with the letter and intent of building codes; in other states a designated agency, generally the state department of education where they have the legal power of approval, reviews and endorses such plans and specifications.

Circumstances sometimes require a consultant architect, usually one who has done recognized research on a problem. In certain instances the owner may wish to engage a designer who is remote from the site of the work and pay him a fee as associate architect, while retaining an architectural firm resident near the project for business management and supervision of the work.

STUDY OF SCHOOL SITE

The owner by established custom is bound to furnish and pay for a complete site survey and other information including that on leases of land, on utilities, and on test borings for determining the bearing capacity of the soil. The architect may be asked to arrange for these studies on behalf of the school board, particularly the testpits and experiments to ascertain nature of the soil and its support capacity. The architect also may secure verification in writing from appropriate city departments or public utilities of information as to sewer, water, gas, and electrical service.

With such additions as the architect may request, the school authorities could furnish the following instructions to the surveyor of a site: [5]

CHECK LIST FOR INSTRUCTIONS TO THE SURVEYOR

Boundaries

Show boundaries of property as indicated by existing land-marks and by recorded deeds.

Boundary and other roads

1. Show all existing railroads, roads, and private rights of way, all traveled ways, turf-planting strips, curb walks, street railways, lamp-posts, electric-wire posts, fire hydrants, manhole covers, and catch-basins.

2. Indicate exact location of all sewers, water and gas mains and of street connections to them; state sizes of water mains; size and location of water-taps and service stub at curb; size and depth of sewers, if last is not available in front

[5] *Handbook of Architectural Practice*, American Institute of Architects, Washington, 1951, pp. 40–41.

outlets, heating and ventilation system, permanent equipment, and other items not readily shown on preliminary sketches. The views of specialist engineers may have to be sought. Of equal importance, the architect should have ready a statement of furniture and equipment requirements as approved by the superintendent. The minutes of all these conferences and the recommendations offered should be filed, and tentative decisions documented for future reference.

The architect may wish to construct perspective sketches, scale models, and colored elevations to help the untrained person and public grasp the physical mass, proportion, scale, and relationship of elements in a proposed school plan. The architect should be present himself to explain the meaning and wisdom of the proposed scheme.

If an educational specialist has been retained, it is wise to invite him to inspect the preliminary plans and outline specifications. Most errors, both in cost and in efficiency of the final product, could be avoided by deliberative and intelligent study of the preliminary sketches and outlines. Time should be scheduled, in planning the administration of an over-all building program, to permit the whole school staff to examine them extensively and carefully.

A school system is obligated to give the architect every assistance and encouragement to create a satisfactory solution. For this reason, prior conferences and exchange of diagram studies would be proper, and in fact the evolution of these conceptual solutions is itself inspiring. The preliminary blueprints will then represent the best synthesis of all the given requirements and suggestions.

Since the preliminary sketches and outline specifications are a part of the contract agreement with the architect, they should be identified by file number and date and recorded in letters of transmittal. This step has to be taken before final plans and specifications are ordered.

CHECK LIST FOR PRELIMINARY PLANS AND OUTLINE SPECIFICATIONS [6]

Particulars to be shown

Preliminary plans submitted for preliminary approval should fix and illustrate the size and character of the project in all its basic particulars and normally should include the following:

1. Plot plan, to scale, showing
   a. Size and shape of entire site with overall dimensions and points of compass
   b. General topographical conditions, including contour lines

[6] Bureau of School and Community Services, *Public School Building Guide Including Standards for Approval*, Connecticut State Department of Education, Hartford, Conn., 1950.

Drafting

The map is to be in ink on tracing-cloth at scale of . . . feet to the inch.

No water-color to be used.

True magnetic meridians to be shown by simple arrows on margin of map.

The title to be in small letters on lower right-hand margin, giving Owner's and surveyor's names and date, and scale of map.

PRELIMINARY PLANS AND OUTLINE SPECIFICATIONS

The school superintendent should provide the architect with a statement of educational specifications approved by the school board before he begins work on preliminary plans. This step was outlined in Chapter 12.

Since the purpose of the preliminary plans prepared by the architect is to provide a functional, efficient, and economical design for these educational specifications, the school administrator and his staff must work closely with the architect. Questions raised by the architect may lead to a modification of the educational specifications. Questions raised by the educational staff may lead to better solutions than would have been imagined otherwise.

At the time an architect delivers his preliminary drawings and outline specifications to the school board, he requests their approval and instructions to proceed with preparation of final plans and specifications. Preliminary sketches submitted at this time ought to express clearly the design of the building as a whole. An educator has the keenest interest in such preliminary plans because these drawings disclose in full detail the physical projection of his educational specifications. Their approval should not be authorized without complete study and recommendation of the school administration.

The school board makes one of its most important decisions the day it approves preliminary plans and outline specifications for a construction project. Reviewing bodies such as school-plant divisions of state education departments want to examine first the preliminary blueprints of any proposed project. After final plans and specifications are drafted, there will be much pressure not to undertake extensive revisions, desirable though they may appear to be from any standpoint.

This is the occasion to arrive at many major decisions on the specifications. The architect will have prepared a tentative outline of the specifications for discussion. He needs to reach substantial agreement on finishes, building equipment, and procedures for bidding.

Frequent conferences with the school officials normally precede the preparation of any outline specifications. Understandings will have to be reached on such specific items as windows, chalk boards, tack boards, floor coverings, shades, wall finishes, lighting fixtures, electrical service

intendent and his staff before they grant formal approval of them as they legally are bound to do.

In reviewing the final plans and specifications some expert assistance may be needed. Many decisions as to type and quality of equipment, finishes, structural materials, and methods will have been made after the adoption of the preliminary sketches. The detail of design, layout, and cabinet work will be drawn and specified for the first time in complete form for examination. The school board ought to know not only what the specifications call for as written but what in the way of equipment and provisions have been omitted.

The specifications will control the method of bidding (as discussed in Chapter 19). The general conditions of the specifications cover a multitude of contractor's duties, safeguards, legal provisions, and division of responsibilities that bind owner and contractor alike. The technical clarity, consistency, and completeness of the plans and specifications may have considerable influence on the bid price.

From every angle the school board is advised to provide enough time for examination of the final drawings and specifications by competent personnel.

Clarity and Completeness of Plans. Accuracy, conformity, clarity, and simplicity of working drawings and specifications encourage more favorable bid prices. Savings result from less uncertainty about conflicts or contingencies that may arise. Complete and clear plans minimize the labor of contractor's designing and decisions, remove uncertainty about the effect of specifications for alternates, and assure expeditious, time-saving relationships among contractors, supervisors, and trades.

Working drawings may err on the side of either overdesign or underdesign. Overdesign increases the complexity of achieving absolute conformity. It adds to the demands upon labor and substitutes custom-made items for standard commercial products. The owner's cost increases not only for the custom-made equipment but also for the wages of skilled labor necessary to install it. Underdesign is apt to cause such poor results as hazardous construction, extra foundation work, inappropriate materials, unsanitary conditions, fire hazards, awkward location of mechanical installations, excessive labor costs, high maintenance charges, misfitting equipment, incompatibility of working drawings with specifications, and omission of essential building appointments. Either of these extremes of design encourages contractors to overbid. The school board has to rely mainly on the architect's craftsmanship to achieve economy through properly executed plans.

Ethical practice during the bidding procedure dictates that interpretations of plans and specifications be given only in writing and that all bidders receive copies of the interpretations of addenda. The final work-

- c. Location of the proposed building on the site, its future additions and existing structures
- d. A tentative development plan of site showing location of service and recreational areas
- e. Buildings on adjacent properties and within 40′ of the party lines
- f. Adjacent streets, higbways, sidewalks
- g. Location of existing utilities, such as water, sewer, electricity, gas, telephone, hydrants, municipal fire-alarms

2. Floor plans to scale, usually not less than $\frac{1}{16}$″, showing
   - a. Type of wall, floor, partition, roof and stair construction
   - b. Location, sizes, and purposes of all rooms
   - c. Location and sizes of all stairs, corridors, doors, windows
   - d. Location of plumbing fixtures and built-in equipment
   - e. Tentative equipment layouts for special rooms
   - f. Overall dimensions
   - g. Future additions
3. Elevations (at same scale as plans) of four sides showing
   - a. Exterior treatment
   - b. Over-all dimensions
   - c. Finished floor and ceiling levels
   - d. Finished outside grade
   - e. Windows, doors, steps, areas, retaining walls, and so on
4. Sections (at the same scale as floor plans) where necessary to explain any conditions not made clear in other drawings
5. Proposed water supply and sewage disposal facilities

Outline specifications

Outline specifications submitted for preliminary approval should include at least the following information:

1. Type of construction: foundations, walls, floors, partitions, roofs, stairs, etc.
2. Materials of exterior finish: walls, roofs, windows, doors, trim, etc.
3. Materials of interior finish: walls, floors, ceilings, trim for various types of rooms
4. General contract equipment: cabinets, counters, chalk boards, display facilities, shelving, facilities for control of natural lighting
5. Mechanical provisions: plumbing and sewage disposal, heating, ventilation, electrical, signaling and communication for various departments

FINAL PLANS AND SPECIFICATIONS

The superintendent and the school board have several concerns with regard to the preparation of the final plans and specifications. In the first place it requires a considerable period of time to execute this phase of the work, and the school board must reach an understanding with the architect as to his time schedule on that score. The school board needs to have the final plans and specifications reviewed carefully by the super-

school plans is to leave either too much or too little to the contractor's judgment when he installs the equipment. The placement of operating equipment may not conform to good job analysis of the work of the operator, a defect typical in school-cafeteria kitchens where workers frequently complain about conspicuous errors of layout. Changes in the basic plan entail changes of all the related engineering plans, and this type of correction may have been slighted. All these problems reinforce the observation that to achieve economy the architect himself must be capable of producing economical plans.

File Copies as Property Records. The architect's contract seeks to protect him against use of his drawings and specifications on other work; but it is important that accurate documentation of all officially approved plans and specifications be preserved by the school district as a legal record for the life of the building. It is the school architect's duty to furnish amended and corrected blueprints for the school file including (1) alternates accepted, (2) equivalents supplied, (3) change orders as they amend both specifications and working drawings, (4) and addenda. A knowledge of these changes may be very important in future alterations of or additions to the structure.

Copies of final plans and specifications should be permanently preserved in the school business office with other school-property records. The architect should supplement the plans with notes concerning (1) a future maintenance program, (2) provisions made for alteration or expansion, (3) proposed upkeep of grounds, (4) plans for long-range site development, (5) guarantees, (6) directions for maintenance and operation of special equipment, including manufacturer's instructions, (7) an explanation of his special solutions to various problems that will lead to efficient utilization of plant facilities, and (8) instructions for custodians on care of finishes and mechanical equipment.

SUMMARY

The architect is a professional person engaged by the school district for necessary services. The capacity in which he is employed will determine his duties, the most common capacity being that of executive or project architect. His services will include preliminary studies, tentative or preliminary plans and outlines, final working drawings and specifications, business management of bids and contracts, supervision of work, and certification of payments. In order to carry out these duties he must do research, protect the business interests of the school district, expedite the projects, and oftentimes counsel the local unit on its management of the building program.

In choosing an architect it is advisable (1) to adopt a statement of qualifications, (2) to observe ethical practices, (3) to canvass available architects, (4) to conduct objective systematic inquiries, (5) to inspect the work of prospects,

ing drawings and specifications are bound as complete sets. They must be clear, comprehensive, consistent, readable, and simple as is evident in light of the special objectives they serve, namely, to enable exactness in competitive bidding, to constitute basic elements of the contract, to ensure against trouble during execution of the work, and to facilitate supervision of construction. A good working drawing gives the builder exactly the information he needs to build from, with nothing essential lacking, nothing inconsistent, and nothing so designed as to raise his costs without reason. The skill of producing adequate and efficient plans and specifications rests largely in the organization of the architect's own office.

Responsible contractors sometimes avoid bidding on school projects because they fear costly delays. Working drawings and specifications should allow for the construction schedule of the several trades involved. It must be made clear to the bidder that the school board and the architect within the limitations of governing laws and conditions will cooperate fully with the contractor to help him build a satisfactory product on a prompt time schedule.

Evaluation of Plans. As a general rule, plans and specifications designed by an architect should be thoroughly checked as to compatibility of mechanical systems and structural plans before the school board advertises for bids. Mention has already been made of the necessity of specialized engineering services for a project having the magnitude of a school plant. These engineering services may be located in the office of the architectural firm, but many times the plans and specifications for heating, cooling, plumbing, illumination, ventilation, and other systems will be prepared outside the architect's office by consultant engineers. In any event it is the duty of the chief architect to coordinate in his basic structural plan the drawings of the several mechanical systems.

The relationship of the various systems and plans is functional. In the case of air cooling, for example, 70 per cent of the economy and effectiveness of cooling is said to be in the design of the building rather than in the output of the mechanical cooling system. The heating system has to be adapted to the building, but the structure controls the effectiveness of the heating system. The same principle holds true in lighting and in ventilation. It is in the coordination of engineering and architectural skills that eminent school architects achieve outstanding plans.

The saying is common that one has to live in a new school building in order to know its virtues and defects. Sometimes the mechanical controls will occur at inaccessible places. Often one finds it extremely difficult to repair, replace, or adjust ventilation or electrical systems because room has not been allowed for their care. Essential storage in connection with mechanical systems may have been omitted. A common mistake in

10. Prepare an outline of items concerning which the school architect may be expected to instruct the user of the building.

11. Prepare a chart showing the functions of the school architect's office in relation to the time schedule of a school-building program. How much time should be allowed for the creative design of the school-project plans?

12. Prepare an agenda for a conference with the architect during the preliminary survey of school-plant requirements.

RELATED READINGS

American Institute of Architects: *Handbook of Architectural Practice*, Washington, 1958.

———: *Standard Form of Agreement between Owner and Architect*, Washington, 1958.

———: *Educational Specifications* (prepared by Russell E. Wilson), Washington, 1955.

American Jurisprudence, rev. ed., "Architects" in General Index, Bancroft-Whitney Company, Rochester, N.Y.

Caudill, Rowlett, Scott, and Associates: *Services in Architecture*, Bryan, Tex., 1953.

Chambers, M. M.: "Architect and His Hive," *Nation's Schools*, 24:59, December, 1939.

Colmey, J. W.: "Fees for Architectural Services in School Construction," *American School Board Journal*, 128:46–47, January, 1954.

Cowgill, Clinton H., and Ben J. Small: *Architectural Practice*, Reinhold Publishing Corporation, New York, 1951.

Dixon, W. Irving: "Let's Learn from Mistakes in Schoolhouse Construction," *Nation's Schools*, 52:71–73, October, 1953.

Dunham, Clarence W., and Robert D. Young: *Contracts, Specifications, and Law for Engineers*, McGraw-Hill Book Company, Inc., New York, 1958.

Essex, D. L.: "Board of Education and Its Architect," *American School Board Journal*, 92:31–32, March, 1936.

———: "Basic Principles of School Building Design," *American School Board Journal*, 116:19–20, January, 1948.

Haisley, O. W.: "Basic Considerations When the Board Is Going to Select an Architect," *American School Board Journal*, 122:21–22, January, 1951.

Herrick, J. H., L. B. Perkins, and T. J. Higgins: "Architect vs. Educational Consultant," *Nation's Schools*, 44:34–35, October, 1949.

Perkins, Lawrence B.: "Functions of the Architect," *School Executive*, 67:45, December, 1946.

Ramsey, Charles G., and Harold R. Sleeper: *Architectural Graphic Standards*, John Wiley & Sons, Inc., New York, 1941.

Seagers, Paul W.: "Relationship of the School Administrator to the Architect in Plant Planning," *American School Board Journal*, 113:41–43, December, 1946.

Small, Ben J.: "Suggestions for Writing Architectural Specifications," *The American School and University*, 25:181–184, 1953.

(6) to interview selected individuals gaining full knowledge of their capacity and services, and (7) to make an impartial decision.

Before entering an agreement, the school board needs to understand the full range of specific services of an architect. These should be stated in detail, although the contract made with an architect is essentially to engage his professional advice and skill. Compensation depends upon the capacity in which the architect is retained.

The architect will consult at length with the school administration and staff on the educational specifications and needs. He may arrange for soil tests or additional survey. The owner is to furnish an adequate land survey of the site.

Preliminary plans and outline specifications, when presented by the architect, constitute a strategic opportunity for major decisions concerning the project. Most of the final adjustments in planning can be transacted at this stage, before work on final or finished plans and specifications is ordered. Also, the specifications determine the method of bidding. They represent a major means of economy in the final product as they condition the bid prices.

Clarity, completeness, conformity, and simplicity should characterize the final working plans and specifications. They should be thoroughly reviewed prior to approval action by the school board. In fact, the school administrator should recommend the necessary steps of approval only after allowing due time for complete study. Upon completion of a project, the school architect is obligated to furnish corrected plans for the permanent records of the school district. In addition he should be invited to instruct the owner fully on the use and preservation of the building.

DISCUSSION PROBLEMS

1. Should one architectural firm be retained for all work of a large school district or different architects receive contracts for particular projects?
2. Prepare a list of the technical documents for which the architect is responsible.
3. Show that the architect must be a successful business executive not only to save the district money but to achieve a superior school building.
4. What is the architect's responsibility for working drawings prepared by the contractor?
5. What is meant by the statement, "employing an architect capable of economy?"
6. Should the school architect's services include plans for development and landscaping of the school site?
7. Discuss some of the approvals by other agencies and the various public relations tasks that the school architect may be asked to negotiate for the school district.
8. Illustrate the type of specifications that an architect may prepare preliminary to the renovation of an existing school plant.
9. What are some practical considerations in estimating the cost of a long-range school-building program?

CHAPTER 18

Problems of Design and Economy

A number of tangible threads have been evident in public education including general acceptance of compulsory education, lengthening of the school year, higher levels of professional education, reduction of class size, expansion of vocational education, growing public interest in what schools can do, and the interest of industry in employing high school and college graduates. From many sources have come mandates and they have been of many kinds: state laws and state department regulations governing courses of study, attendance, or minimum staffing; the high school accreditation agencies ruling on such details as periods per week of a subject and length of periods; the entrance requirements of colleges and other pressures toward a uniform method of transferring credits; the public demand for sanitation, safety, and health, and for student activities; and the stimulation effect of state aid. All these are factors that have influenced the expressed need for school facilities.

It is against this background that education specialists and citizens form their judgments. Marked trends toward modern concepts have been disclosed in the emerging design of school-plant facilities. At the same time the probability of growing needs for facilities in the future has accentuated the necessity of attaining economy.

TRENDS IN SCHOOL-PLANT DESIGNS

New construction methods and experimentation under the climatic conditions found in various parts of the country have opened new vistas to schoolhouse planning. The movement toward functionality of design

Smith, H. D.: "What the Architect Expects of the Client," *The American School and University*, 21:39–42, 1949.

———: "The Architect as an Administrative Officer," *The American School and University*, 19:43–47, 1947.

Van Nuys, Jay C.: "What the Architect Expects from the School Administrator," *The American School and University*, 19:57–59, 1947.

Warnecke, J. C.: "Administering a Construction Program: A Comparison of Methods," *The American School and University*, 22:109–112, 1950.

Whitehead, Willis A.: "The Architect and School Plant Planning," *School Executive*, 66:11–14, April, 1947.

Wiley, G. E.: "Function of an Architect," *American School Board Journal*, 96:21–22, January, 1938.

Wiltse, Earle W.: "Before the Architect Begins," *American School Board Journal*, 130:33–34, January, 1955.

areas: classrooms, library, recreation, cafeteria, storage, laboratories, auditorium, shops, music, arts and crafts, and the like.

Spaces interrelated for efficiency and economical operation. Eye-catching features that distinguish the design of functional buildings might be the provision of public areas, the close planning of indoor and outdoor activities, or the special designing of a variety of administrative rooms and equipment. But some of the less apparent although very important features one discovers quickest as he works in the building: ease of supervising pupil groups, accessibility of storage spaces, convenience of circulation to various resource areas, such as the library, playfields, health room, gymnasium, and auditorium. A major characteristic of modern schoolhouse design is freedom from distractions such as noise, interruptions, poor ventilation, or inconvenient location of equipment. There is a positive concern for the daily work of the teacher and the child.

Spaces to meet modern-facility requirements. The required spaces may include library, recreation, health room, conference room, cafeteria, storage, laboratories, shops, community-interest centers, offices, auditorium, extraclass activities, and the like. The school board has primary responsibility for defining its future school-building program in terms of the philosophy the community accepts and the probability of change. It must define the metes and bounds of the educational and cultural program. Shall free public kindergartens be instituted? How far shall the school district go towards providing a community college, vocational education, adult education, or public recreation? Shall the school program be restricted to formal classroom studies or branch out into numerous informal learning activities, as, for example, dramatics, school band, school camping, athletics, and sports which call for physical facilities? What services shall be rendered in the way of transportation, food services, health, guidance, library resources, and the like?

The picture is vividly drawn in a statement from the Twenty-fourth Yearbook of the American Association of School Administrators:[2]

> We no longer dare to allude to children in the classroom as the sum total of school life. We know that often the classroom, altho a center of life and work, is vacant as children work and learn in garden, museum, city hall, manufacturing plant, or thru cooperation with community groups for the common good. Furthermore, as we look into the several classrooms we find that the "children," in some cases, turn out to be adults. Here are young homemaking mothers learning to fashion children's clothes in the evening school, and there is a public forum including some community big-wigs, a scattering of "crack-pots," and a goodly number of thoughtful people of various ages, who differ widely in economic status, social position, and viewpoint. Where once there were only cloistered classics there are now humming machines geared, educationally, to meet

[2] Pp. 225–226.

gained impetus from imaginative architectural trends of Finland, Denmark, Sweden, and Norway in the early years of this century. The modern functional school in America is distinguished by its maximum utility.

Functionality in Use of Space. Of particular interest to modern schoolhouse planners has been the relationship of space and time to actual educational operations.

Maximum utilization. The modern, well-designed school does not waste space. There is no place for the empty attics and basements of former years. Even the corridors may be eliminated or else serve a dual use for wall storage, display cases, and the like. Space is to be provided because it has an educational or practical reason for being.

Spaces designed in terms of teaching facility. Each room arrangement seeks to make accessible the desired teaching facilities. Size, shape, and appointments are based upon a job analysis of diverse potential learning activities. The purpose is not simply to be different or to exaggerate. Functional architecture is planned from the inside outward. The teaching job to be done now and in the future is given priority, since the school building must provide "teaching stations" for professional employees.

The vast amount of experimentation with size, shape, character, and material of educational spaces that has been conducted in the last decade gives the greatest promise in educational history of finding flexible, scientific solutions to this question. In the introduction to *Space for Teaching*[1] it is stated of the author of the report, "He has consulted school superintendents, teachers, pupils, custodians; *he has spent endless hours in the classroom to observe just what goes* on; he has consulted architects, engineers, manufacturers of school furniture, city planners; and has visited many of the school systems throughout the state—all in an effort to find the basis for the new approach."

Many aspects of educational organization can be explained in terms of a dominant teaching method. The designer must look at the various possible methods of organizing group activities. Is the class divided into groups with a differentiated curriculum? How do small groups and individuals spend their school day in specific relationship to projects, displays, library reference, demonstrations, recitations, free group activities, use of out of doors, nature study, art, music, dance, drama, and play? Among these varied learning activities, what is done to promote teamwork, initiative, appreciation, voluntary participation, consideration for others, or preparation for the occupations of adulthood? What space is needed for individual bench work in the secondary school? What for large formal groups? What for voluntary informal groups? Thus there has developed a tendency to designate schoolhouse spaces as specialized

[1] W. W. Caudill, *Space for Teaching*, Bulletin no. 59, vol. 12, no. 9, Engineering Experiment Station, A & M College of Texas, College Station, Tex., 1941.

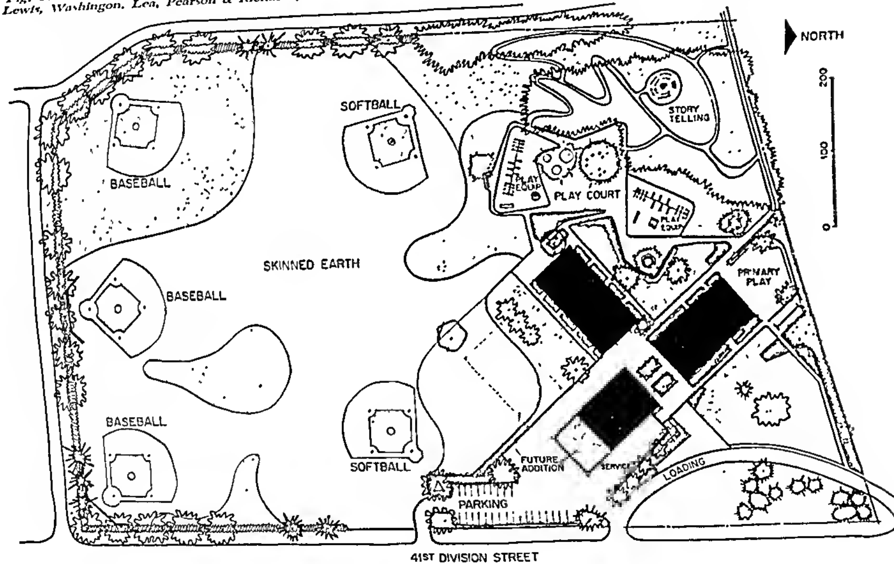


Fig. 18.1. Site improvement should allow for future playground and building expansion. Fort Lewis Elementary School, Fort Lewis, Washingon. Lea, Pearson & Richards, Architects; Wallace M. Ruff, Landscape Architect. (Dupont-Fort Lewis Schools.)

community needs in industry. Alert men and women come from stores and farms and join groups at work on problems of distributive occupations and technical agriculture; and, lest someone long with too much regret for the school of yesteryear, there are now ten times as many volumes, prints, and pictures on the classics in the school library as there were at the turn of the century. As we consider educational plans for the future we are by no means starting from scratch. The foundations are broad and the heritage is rich, but if we are critical in our observation we cannot escape being disturbed by the lag between what we know and what we do.

Adaptability Characteristics. Experience has shown that besides immediate functional values the school plant must be adjustable to future needs. Certain of the recent trends in school-plant design have become well established. Plans for proposed new construction should take advantage at least of these improvements.

Flexibility. A functionally designed school building is capable of periodic alteration in the size and shape of its rooms which may be attained through such features as nonweight-bearing partitions, properly located service lines, suites of related rooms, modular dimensioning of windows and columns, and logical location of exits. Even though all contingencies cannot be anticipated, it is better to be able to move some partitions than none at all. Since systems of prefabricated partition units are in the experimental stage, the better-known way of providing for removable partitions in class A buildings is the lightweight-masonry wall. However, space dividers of very adequate type may be in the form of freestanding cabinets and certain utility surfaces, on the theory of a doorless-schoolhouse layout. Another practical approach to flexibility is through interchangeable utilization of spaces, for example, an elementary classroom pattern that could easily be converted to junior high school use, or a homemaking-department layout that could be extended to any desired number of rooms.

Expansibility and convertibility. Generally the principle of expansibility starts with site contours and plot plan. The proper shape of building and the precise location of those departments most likely to expand increase the number of possibilities for wing additions. Modern school buildings designed on the principle of expansibility may not in future years have to do violence to their whole layout when it becomes necessary to incorporate the building additions. Specific directions of expansion are indicated and allowed for at end walls; corridors extending to exterior walls; fenestration being nonessential; drives not encircling the building; and roof lines permitting extension (Figure 18-1).

How much extra capacity to include in the central mechanical system, sewers, electrical conduits, heating plant, and hot and cold water lines must depend upon circumstances. Whether to build auditoriums, gym-

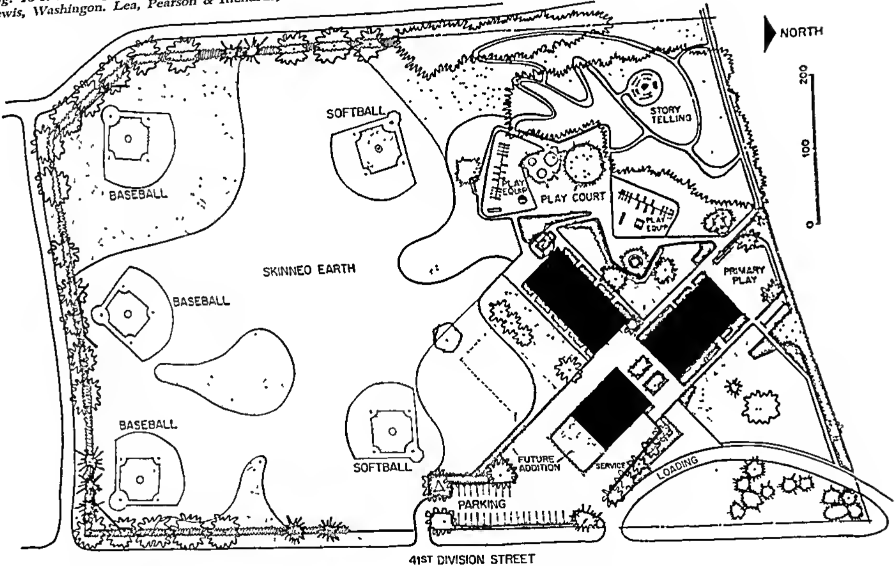


Fig. 18-1. Site improvement should allow for future playground and building expansion. Fort Lewis Elementary School, Fort Lewis, Washingon. Lea, Pearson & Richards, Architects, Wallace M. Ruff, Landscape Architect. (Dupont-Fort Lewis Schools.)

nasiums, cafeterias, foyers, and the like in terms strictly of present enrollment or with a view to the possibility of having an expanded plant of the future may depend upon the reliability of long-range forecasts. It is usually quite expensive to duplicate special rooms, and so they generally ought to be designed large enough. All these decisions will have to depend upon a resolution of the many community factors indicated by a survey.

Adaptation to climatic conditions. With respect to insulation, shade, wind pressures, mechanical heating and cooling systems, durability of exterior finish, and orientation, the modern, functional style of architecture places foremost the principle of adaptation to environment. There is considerable cost economy possible by studying the suitability of a building to its environment, as architects will generally testify. More could be done, however, in the way of adaptation of educational facilities to the environment. This is especially true of physical education. The adaptation of vocational education facilities to environment has notably lagged.

By means of zoned units of the building, planned vacationtime-activity areas, air-conditioned music rooms, and the like there has been a trend toward meeting the special requirements of a year-around utilization of school plant. Modern school buildings are planned for evening programs as well and for community use of selected school-plant areas.

Current literature on school-plant design features a wide variety of adaptations. One learns of sloped and split-level floors, irregularly shaped rooms, designs to funnel wind pressures for interior ventilation, sky domes for natural illumination, and many new patterns of lateral fenestration.

Provision for modern equipment. Functional schools have running water, electrical service outlets, and other utility implementation so located that modern equipment can be installed as desired and made accessible where the teaching needs to be done. The emphasis is on efficiency of operation. Such provisions are also designed to accommodate the needs of custodial and other nonteaching service personnel. A functional school is not a bundle of gadgets; it simply makes common-sense provision for addition of new equipment as needed.

Utilization of walls. Wall spaces are carefully planned not only as to fenestration but also in terms of teaching activities, chalk board, display, storage, and the like. The walls need to be soundproof, a factor as important as the room's internal acoustics.

Reduced cost of construction. An outstanding result of modern functional design in recent years has been the reduced cost per usable square foot of instructional space. New-type materials and construction methods have lowered the initial cost of schools. Space-saving devices have been introduced, such as the elimination of stairwells, laying ground slab,

CHECK LIST OF MODERN ADVANCES IN SCHOOL DESIGN

1. New construction methods: slab structure and curtain walls, modular dimensioning, prefabricated durable materials
2. Larger school sites: adjusted to community environs, provide an environment for teaching, involve transportation, permit new campus layout
3. Adjustability of the building: provisions for alternate uses, allowance for economical expansion, location of utility service lines for flexibility and ease of altering size and shape of spaces or conversion to other uses, long-range educational-utilization plan for the site
4. Attention to special service details: power lines and outlets, storage adequacy and accessibility, service entrances, repair shops, ease of cleaning and maintenance
5. Attention to the learning atmosphere: teaching walls, pleasing colors, harmony of floors, furnishings and equipment, freedom from distractions
6. Provision for educational activities: less concern about curriculum than the methods of instruction, planning for modern types of equipment, time-saving layout for circulation
7. Attention to health and safety: standards (and mechanical equipment) for illumination, ventilation, heating, sanitation, drinking water, acoustical design, and adequate provision for fire safety
8. Economy: plans, not monumental, based on utilization standards of square footage in comparing construction costs, adapted to economy of operation and maintenance according to climatic conditions, elimination of stairs and other wasted space, exterior corridors where feasible, natural illumination
9. Esthetics: based upon pleasing contrasts—use of color, light and shadow, harmonious proportions, skylines, textures, asymmetrical patterns, adaptation to contour and environs, minimum of classical decoration (however, period-type styles still have a place)
10. Adaptability: irregular-shape rooms, use of skylighting, of wind pressures for ventilation, sloped ceilings, covered outdoor play areas, socializing centers and courts, landscaping, variety of furnishings, air conditioning, unit buildings

applying interior finish directly to roof slab, and designing out-of-doors exterior corridors. Study must follow on the subsequent cost of operation and maintenance. In some regions the high land values may offset the potential economy of low-cost single-story construction. It is not yet known exactly how educational efficiency will be affected by overextension of corridors in the very large secondary schools, but theoretically the multistory school would admit of easier control.

Design of special facilities. The foregoing criteria apply to a facility as a whole. A great deal has been written about the design of specialized classrooms, auditoriums, facilities for health and recreation, libraries, laboratories, student-activity facilities, cafeterias and food-service facilities, staff rooms and offices, administrative offices, conference rooms, and

other special-purpose facilities like those for music, art, home economics, and shops. Criteria regarding the design of the facility as a whole may be applied to each such special facility, particularly the criterion of flexibility. How can the special facility be designed to make it adaptable to other uses in the future? Can the special feature be provided without making it part of the structure itself? These matters should be made clear in the educational specifications prepared by the school staff.

Modern standards. The general theory of standards, as explained in Chapter 6, covers standards of illumination, comfort, sanitation, ventilation, drinking water, safety, acoustics, ease of movement. A characteristic of the modern functional school plant is its very high rating indeed on all these standards.

Esthetic Learning Environment. Color, light and shadow, proportions, rhythmic lines, texture of materials, adaptation of building to contour, and asymmetrical patterns are among the attractive elements of functional architecture. Unless there is a proved utility value, classical decoration is used very sparingly in modern styles of schools. However, some unusual interest centers, such as mural paintings or creative patterns, may be included. In general, attention is directed toward skyline facades and the landscaping of foundations and grounds.

ECONOMY IN SCHOOL BUILDINGS

One of the most common demands upon the superintendent of schools and the school board is for economy in school construction. In most such instances economy is voiced in terms of low initial cost. Confronted by such pressures, the school administrator must understand and be able to interpret to his school board and community the true meaning of economy.

To achieve substantial cost saving without impairing the educational results, one should first look to the areas of decision that offer alternatives involving large expenditure: (1) the price paid for a school site, (2) the choice of a site that has minimum expense for development and that promises long-term usage, (3) conservatism in the survey of school-plant needs, (4) efficient educational utilization of all school-plant spaces, (5) efficient provision for the maximum output from the professional staff who will work in the school, (6) economical designing by the architect, (7) durable materials and equipment, (8) modern standards to avoid early obsolescence, (9) obtaining lowest bids consistent with good workmanship, (10) good coordination and supervision of the job, (11) reduced interest on bonds, (12) low cost of upkeep and operation, (13) business practices that protect the school district, and (14) planning for long-term utilization of the plant.

The purpose of economy is to obtain the greatest value for the ex-

CHECK LIST OF ECONOMIES IN SCHOOL-PLANT DEVELOPMENT

Economy in school-site selection and acquisition

1. Adequacy of site: correct location; topography and soil conditions
2. Cost of school site: obtaining favorable price; reasonable cost for the development of the site (utilities, etc.)
3. Acquisition of school sites (business procedures)

Economy through planning

1. Educational planning
   a. Space requirements, space allocation, combination facilities, full-time usage, alternate uses, interrelationship of facilities, saving in maximum use of time of professional workers, conservatism
2. Plans and specifications prepared by the architect
   a. Architectural design: types and shapes of buildings, compactness, framing, expansibility, design of walls, roof, floors, foundations
   b. Mechanical services: lighting, heating, ventilation, plumbing, signal systems, other engineered features
   c. Methods and materials: tested materials, available materials, use of local labor, desired durability of materials, finish materials, windows, avoid extravagant trim and design, prefabrication, quoted alternates
   d. Quality of plans: simplicity and exactness, clarity and conformity, not over- or underdesigned (plans meet modern standards of safety, sanitation, comfort, illumination, convenience)
3. Equipment: functional, competitive, meets institutional standards

Economy in business administration

1. Saving through total budget planning
2. Control of all approvals; architect certifies payments
3. Architect and technical advisers give full services and can economize
4. Protecting the owner's interests—bonds, insurance, inspection
5. Avoiding expensive delays and extra costs after contracts are let; cooperation among the trades
6. Cost savings in rehabilitation and modernization projects

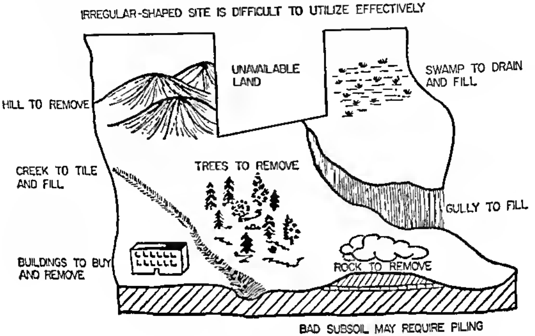
Economy in financial arrangements

1. Low interest charges on bonds
2. Lessen sparsity costs
3. Minimize transportation costs
4. Shorten period of bond issue; provide debt leeway

Economy in operation and maintenance

1. Upkeep and maintenance costs related to initial costs; ease of minor repairs; durability of materials; preservation of building
2. Economize time and labor of staff; proper instruction of the staff; obviate problems of safety, health, and sanitation
3. Flexibility for various alternate usage by plan of construction

Fig. 18-2. Site costs may include much more than the purchase price. The initial cost of a proposed site should be evaluated in terms of the total costs involved. (*Economy Handbook, New York State Commission on School Buildings,* 1953.)



Comparison of Estimated Costs

	Site A	*Site B*
Clearing and grubbing	$ 100.00	$ 1,500.00
Demolition of old building	1,200.00	....
Excavation and embankment	5,000.00	7,000.00
Underdraining athletic field	. . .	3,200.00
Storm drains	300 00	8,000.00
Gravel for roads, parking area, and athletic fields	1,000.00	7,500.00
Cobble gutter	....	950 00
Sodding new slopes	....	1,800.00
Driveways and parking areas	8,200.00	9,500.00
Supply and place topsoil	2,800 00	600.00
Water supply	7,600 00	11,200.00
Sewage disposal	4,500 00	4,500.00
Total for developing and placing building	$30,700.00	$55,750 00
Purchase price	20,000 00	gratis
Total estimated cost, Nov. 1, 1952	$50,700.00	$55,750.00
Additional cost for piling as indicated by test borings on Nov. 10, 1952	$30,000.00	none
Total estimated cost, Nov. 10, 1952	$80,700.00	$55,750 00

penditure of resources. Since most school systems do not have sufficient funds to build all the desired facilities for immediate and anticipated needs, they must exercise every economy to make their available resources go as far as possible. Even the few localities having ample funds can spend their money so wisely as to show where spending more will produce greater value.

Attaining Economy. The key elements in achieving economy are the school site, the educational specifications, the financial plan, and the architect.

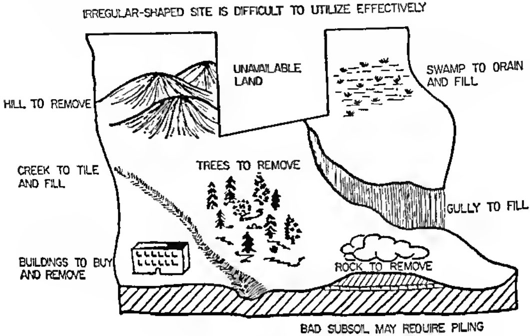
Site considerations. The site is one of the most vital considerations in maintaining economy. Its location partly determines capacity and has far-reaching effects upon the utility of improvements for educational purposes. A site can limit the expansibility of a facility, add to transportation costs, or prove expensive for providing access and utilities. Certain sites are difficult to develop because of expensive grading, fill, topsoils, sodding, grubbing, or removal of structures, rocks, or trees. Sites which are irregular in shape, narrow, damp, hard to drain, and difficult to grade can add to construction costs. It may be necessary to provide expensive drainage, driveways, retaining walls, piling, and other improvements to make them usable (Figure 18-2).

The criteria presented in Chapter 11 if applied intelligently will help the administrator avoid unnecessary expenditures flowing from poor site selection. Unfortunately, it is not always possible to find ideal sites in the general area where a school facility should be located. In choosing among sites which are deficient in one or more respects the superintendent should consider purchase price or probable condemnation cost in relation to the costs of development; providing utilities, access, protection for children, removal of structures, and transportation; securing rights of way; and effects upon construction costs. In such matters he will need the advice of an architect.

Educational planning. The largest single factor in determining the cost of a school facility is the amount and kind of space required by the educational specifications. The superintendent and his staff with the advice of an architect can do much to keep space demands at a minimum, as shown in Chapter 12. The key factors are imaginative scheduling of activities during the school day and the school year, multiple use of infrequently used spaces, provision for partitioning large spaces such as cafeterias that are usable to capacity only for short periods during the day, and keeping down the size of such spaces through ingenious scheduling.

In order to achieve the utmost economy in providing essential spaces the educational staff must possess a certain degree of elasticity in thinking and planning. If economies can be achieved by a solution for gymnasiums, shops, laboratories, and other special facilities which separates

Fig. 18-2. Site costs may include much more than the purchase price. The initial cost of a proposed site should be evaluated in terms of the total costs involved. (*Economy Handbook, New York State Commission on School Buildings*, 1953.)



Comparison of Estimated Costs

	Site A	*Site B*
Clearing and grubbing	$ 100.00	$ 1,500.00
Demolition of old building	1,200.00	.. . . .
Excavation and embankment	5,000.00	7,000.00
Underdraining athletic field	. . .	3,200.00
Storm drains	300 00	8,000.00
Gravel for roads, parking area, and athletic fields	1,000 00	7,500 00
Cobble gutter	. . . . . .	950.00
Sodding new slopes	. . . .	1,800.00
Driveways and parking areas	8,200.00	9,500.00
Supply and place topsoil	2,800 00	600.00
Water supply	7,600 00	11,200.00
Sewage disposal	4,500.00	4,500.00
Total for developing and placing building	$30,700.00	$55,750.00
Purchase price	20,000 00	gratis
Total estimated cost, Nov. 1, 1952	$50,700.00	$55,750.00
Additional cost for piling as indicated by test borings on Nov. 10, 1952	$30,000.00	none
Total estimated cost, Nov. 10, 1952	$80,700.00	$55,750 00

these from the main structure, the possibilities should be explored. Administrative objections often can be overcome without losing all of the potential economy of campus development.

Financial planning. The procedures and potential economies in choosing the proper method of financing school construction and realizing of the lowest-cost borrowing are matters over which the school authorities exert primary control. (Refer to Chapter 15.)

Architectural services. Once the school officials have done everything in their power to achieve economy in site selection, educational specifications, and financing, the matter of economy from there on depends largely upon the architect. If the architect is competent and conscientious in matters relating to efficiency and economy, the school administration is in a most fortunate position. However, if he is primarily an artist, more concerned with expressing his tastes than in saving money, then the school superintendent must be prepared to evaluate his work carefully, especially in the preliminary planning stage. It may even be necessary to retain the counsel of a disinterested building contractor to go over the final drawings and specifications before they are recommended for approval by the school board.

In evaluating preliminary drawings from the standpoint of economy an important objective is to find how the amount of space could be reduced by rearranging spaces with due regard to functionally related facilities. Could corridor lengths be reduced? Could some corridor space or passageways be eliminated entirely? Could perimeter be reduced by an equally satisfactory arrangement of spaces? Could the space allotted to foyers, stairs, entrances, and vestibules be reduced or eliminated in any way? Are there any waste spaces in the plan? Any spaces which are not likely to be used much? Have ceiling heights been reduced as much as practical in terms of lighting and appearance? Are there any seldom-used closets, dressing rooms, cloakrooms, or ticket offices which could be eliminated? Other aspects of design which have serious implications for economy are irregularly shaped rooms, rooms with expensive built-in features, facilities requiring separate plumbing, facilities calling for varying ceiling heights, and highly specialized facilities of any type. Unless a facility can be converted to other uses without undue expense, it is not likely to be economical in the long run.

Once the amount of space to be incorporated into final plans has been reduced to a minimum, major economies from there on are the sum of hundreds of small economies which have to be realized before final plans and specifications are approved. Among the features to be avoided unless they serve a very important function are alcoves, irregular perimeters, jogs and corners, gables, towers, ornamental columns, pitched roofs, ornate entrances, exterior vestibules, parapet walls, and gargoyles. The use of belt courses, copings, buttresses, lintels, arches, and fancy trim

4. Define true as contrasted with false economy. Demonstrate that utilization of the school plant is a function of the cost accounting of the investment.

5. Show how the inadequacy of a building program may result in costly changes and additions in the near future; e.g., in respect to size and location of site, service facilities, capacity of the special-purpose rooms, mechanical equipment.

6. Prepare a balance sheet of costs for a proposed project showing the ultimate expenses for operation and maintenance, as well as the initial costs assuming alternative construction plans.

7. Prepare an outline of cost savings in the following: choice of classroom furniture, signal systems, heating plant, flooring, wall finishes, lighting fixtures, natural lighting, roof structure, equipment for special rooms, custodial conveniences.

8. Can low-budget gymnasiums or auditoriums be effectively illuminated by natural lighting?

9. Explain why cost savings result from reduction of perimeter of the building plan. Why is this not always an index of actual building cost, even where the building materials and standards are approximately the same?

10. Discuss questions of economy in prefabricated and portable classroom structures.

11. Describe ways of reducing the amount and cost of labor in erecting permanent school buildings. Why does simplification of design reduce the cost of construction?

12. What are the future possibilities in standardization of stock sizes and modular dimensioning? Does this have any relationship to functionality and flexibility in design?

RELATED READINGS

American Association of School Administrators: *School Boards in Action*, Twenty-fourth Yearbook, Washington, 1946.

———: *Cutting Costs in Schoolhouse Construction*, Washington, 1952.

Ball, Lester F.: "Providing a Home-like Atmosphere," *Nation's Schools*, 42:58–60, September, 1948.

Balluff, Louis N.: "School Additions Versus Remodeling," *School Executive*, 73:72–75, February, 1954.

Barber, Anson B.: "In This Junior High School the Outside Has Been Invited to Come Inside," *Nation's Schools*, 50:68–72, November, 1952.

Barkan, S. H.: "Relationship between Sizes of School Sites and Land Costs," *American School Board Journal*, 108:34–35, January, 1944.

Bursch, Charles W., and John L. Reid: *High Schools—Today and Tomorrow*, Reinhold Publishing Corporation, New York, 1957.

Caudill, William W.: *School Planning Clinic—San Angelo*, no. 10, Caudill, Rowlett, Scott, and Associates, Bryan, Tex., 1954.

Churchill, H. S.: "Less Costly Schools," *School Executive*, 68:42–44, April, 1949.

Clapp, Wilfred F.: "True Economy in School Construction," *School Executive*, 74:19–21, August, 1955.

School Administrators, various state education departments, and special studies conducted by research agencies, universities, and school-building specialists. Some of the useful publications available to date are cited in the bibliography.

SUMMARY

Among well-established trends in school-plant design are functionality, adaptability, and economy. Functionality applies to the design of spaces in terms of teaching facility. Adaptability is attained through the use of improved design, construction methods, and materials. Cooperative planning of the school architect, the school staff, and the community is expressed first in educational specifications and later in architectural services. The result is a style of school architecture that fulfills modern standards and allows for technological development in education while having its own order of esthetic value.

The criteria for judging economy in schoolhouse construction are implied in a definition of economy which seeks maximum value for the resources invested. These may be summarized as follows:

1. Economy in school construction cannot be judged in terms of initial cost alone. True economy has to be weighted in terms of future costs for insurance, operation, maintenance, and postponed outlays. Some low-cost projects represent postponed expenditures for site development, decorating, interior finish, furnishings, and equipment. Others are indicative of wasteful planning.

2. Economy is a balanced evaluation of the investment in facilities for educational purposes. Reduction in the cost of an item in the building program should not be permitted to curtail the value in another item. For example, the cheapest school site may not necessarily be the most economical if it increases the cost of construction or site development.

3. Economy has to be evaluated in terms of space utilization—efficiency for current use and flexibility for alternate uses in the future. The site and the structure should allow for future expansion of the facility, the location and capacity being based upon thorough study and planning.

4. Economy is achieved by a combination of financial planning, educational planning, creative designs, and finished plans and specifications which provide the maximum of functional space at the lowest possible outlay. The quality and quantity of space relative to cost is the key consideration.

DISCUSSION PROBLEMS

1. What radically different school designs are possible in the future?

2. In what respect could a multistory building be considered more efficient than a single-story structure?

3. Prepare a sketch layout for a department of the school: music, industrial arts, physical education, library, etc. Attach a bibliography of recent articles or other references which you found particularly helpful. To what extent were you influenced by current trends in architecture? By the necessity of making provision for teaching aids?

New York State Commission on School Buildings: *Economy Handbook: Economics from A to Z in Planning School Buildings*, Albany, N.Y., 1953.

Page, L. C.: "More Indigenous Designs Will Result from New Emphasis on Economy," *Nation's Schools*, 51:88, January, 1953.

Perkins, Lawrence B.: *Work Place for Learning*, Reinhold Publishing Corporation, New York, 1957.

Pleason, M.: "Color Planning for School Interiors," *American School Board Journal*, 116:29–30, January, 1948.

"Prototypes for Low-cost Schools; Building Types Study," *Architectural Record*, 107:125–160, April, 1950.

Reid, Kenneth: *School Planning: The Architectural Record of a Decade*, F. W. Dodge Corporation, New York, 1951.

"School House Economy Forum," *Architectural Forum*, 99:119 ff., October, 1953.

"Schools that Utilize the Prevailing Breeze," *Architectural Record*, 105:130, March, 1949.

Severud, F. N.: "Economies in Construction," *Nation's Schools*, 45:46, February, 1950.

Silverthorn, Harold: "Factors that Produce Economy in Schoolhouse Construction," *Nation's Schools*, 53:71–74, May, 1954.

Smith, E. M.: "Interrelationship of Space," *School Executive*, 68:46–51, January, 1949.

Smith, H. L.: "Trends in Education Significant for School Building Planning," *The American School and University*, 18:32–35, 1946.

Stebbins, R. G.: "Functionalism Minimizes School-building Costs and Repairs," *American School Board Journal*, 102:39, May, 1941.

———: "Basic Economies in Schoolhouses," *American School Board Journal*, 124:39, June, 1952.

U.S. Housing and Home Finance Agency: *Statement with Respect to Construction Cost Reductions through Modular Coordination*, Washington, 1948.

U.S. Office of Education: *School Buildings*, Bulletin no. 17, Washington, 1950.

———: *Lighting Schoolrooms*, Pamphlet no. 104, Washington, 1948.

Viles, N. E.: "Importance of Functional Planning," *School Executive*, 56:143–146, December, 1936.

Vincent, William S.: "Tomorrow's School Building," *School Executive*, 67:25–27, November, 1947.

Waechter, H. H., and E. Waechter: *Schools for the Very Young*, F. W. Dodge Corporation, New York, 1951.

Wilson, Russell E.: *Flexible Classrooms*, Carter Publishing Company, Detroit, Mich., 1953.

Womrath, G. F.: "School-building Construction Economics," *American School Board Journal*, series, July, August, September, November, 1930, February, 1931.

Clapp, Wilfred F.: "What We Like about One-story Schools," *Architectural Record*, 103:119–121, March, 1948.

Clark, B. N.: "Economy in School Construction," *American School Board Journal*, 120:37–38, April, 1950.

Davini, William C., and others. *Color Planning for School Interiors*, Board of Education, St. Paul, Minn., 1948.

Demarest, W. C, Jr.: "Economy by Modular Coordination," *The American School and University*, 24:170–176, 1953.

Dorman, C. E.: "Cutting School-building Construction Costs," *American School Board Journal*, 82:43–44, June, 1931.

Engelhardt, N. L.: "Financial Economies which May Be Effected through Improved Business Administration," *School Executive*, 51:99 ff., November, 1931.

Fitch, James M.: *American Buildings*, Houghton Mifflin Company, Boston, 1948.

George, N. L.: "Generously Planned Rancho Village Elementary School," *American School Board Journal*, 128:33–35, January, 1954.

Gibson, Charles D.: "School Plant Lighting," *Review of Educational Research*, National Education Association, 15:41–50, February, 1945.

Gilson, Frank C.: "Questions for the School Planner," *American School Board Journal*, 132:53, January, 1956.

Holmes, W. S.: "Economy, True and False, in School Buildings," *American School Board Journal*, series, January, February, July, 1941.

Ittner, W. B.: "Functional Concept in School Building Planning," *American School Board Journal*, 92:41–42, May, 1936.

Johnson, W. A.: "Economy in Schoolhouse Planning and Construction," *American School Board Journal*, 118:40–43, January, 1949.

Knudson, Vern O., and Cyril M. Harris: *Acoustical Design in Architecture*, John Wiley & Sons, Inc., New York, 1950.

Levin, Robert E.: *The Visual Environment in Today's Schools*, no. 6, Stanford University Press, Stanford, Calif., 1955.

Linn, Henry H.: "Reducing Costs in School Construction," *American School Board Journal*, series, August, September, October, 1954.

MacConnell, James E.: *Trends in School Planning*, Stanford University Press, Stanford, Calif., 1955.

Mansell, T. N.: "Designing Educational Buildings for Tomorrow's Needs," *The American School and University*, 20:63–69, 1948.

Metropolitan School Study Council: *Designing the Elementary School in Harmony with the Emerging Design of Education*, Bureau of Publications, Teachers College, Columbia University, New York, 1951.

Morris, I. E.: "Economy in School Building Design," *Progressive Architecture*, 33:111–114, September, 1952.

Munz, M. T.: "Simple Use of Materials and Methods of Construction Can Produce Low-cost Schools," *Nation's Schools*, 48:60–62, October, 1951.

National Council on Schoolhouse Construction: *Thirteen Principles of Economy in School Plant Planning and Construction*, Peabody College, Nashville, Tenn., 1954.

Methods of Letting Contracts. The school board must decide whether to let a general contract or to let separate contracts. In the former case the general contractor submits a competitive bid which covers the work to be done by his staff and equipment, and also the bids he has taken from one or more subcontractors, plus the overhead of managing and coordinating the project. This general-contract method has prevailed for many years in public-works projects. Indeed it appears to be the most economical and effective plan where the single contractor is honest, capable, skilled in construction craft, an able executive, and has ample funds. The owner reserves, of course, the right to investigate and approve the subcontractors.

The alternative is for the owner to perform the work of management and coordination of the separate contracts himself. By receiving bids on separate (minor or segregated) contracts, the owner avoids such risks as the excessive bidding by a general contractor to cover various contingencies in periods of uncertainty, the political pressures sometimes exerted by large-scale bidders, and the difficulty of controlling the manner in which a general contractor shops around for his minimum bids on subcontracts.

Nevertheless, if a way can be found to avoid the above risks, the general contractor may prove to be a better project manager than the owner, or the owner's agent. Certainly if a general contractor's duties devolve upon the architect, he should be paid for them. Unless the architect is a capable administrator and has his office well organized for such work, he is advised against attempting to direct the work of separate contractors since the burdens of such construction management may consume a substantial portion of the additional percentage he accepts.

Many technical services have to be marshalled in order to execute a building contract and comply with instructions given in the working drawings and specifications. The contractor, therefore, is a business and technical executive guaranteeing through his organization to manufacture a product on which he has set the price. He has to be very careful, competent, trustworthy, and resourceful.

A contractor cannot be condemned for refusing to spend money on items which the owner and architect failed to specify. On the other hand, the integrity of the contractor's reputation and his interest in the school system's welfare should cause him conscientiously to furnish top-grade workmanship and to turn out a finished product that will be permanently satisfactory.

The laws of many states now require that, for public work, bids on plumbing, heating, ventilation, electrical work, sewage disposal, power plants, general construction, and the like shall be received separately and contracts awarded to the lowest responsible bidder for each branch.

CHAPTER 19

Construction Problems

After final plans and specifications are completed and approved by the school board, the next steps are the soliciting of bids and the letting of contracts for construction and site development. As explained in a preceding chapter the architect is responsible for most of this work, but the school attorney is responsible for seeing that all laws have been complied with and that the school board's interests are safeguarded through surety bonds and other means. Provisions have to be made for supervising and inspecting construction.

PROCEDURES FOR BIDDING AND LETTING CONTRACTS

The school attorney should be counselor to the district on advertisements, contracts, payments, orders, and negotiations. However, the executive architect must integrate his plans and specifications with the procedures for letting contracts, and he is normally responsible for preparing the technical documents incident to advertising for bids.

Consequently he must advise and seek instructions from the school board on at least the following matters of procedure:

1. Timing of bids
2. Bid and construction bonds
3. Invitation to bidders
4. Method of bidding
5. Rejection of bids
6. Conditions of contracts
7. Superintendence of the job

As a rule, it is better to handle the furniture and portable-equipment contracts separately.

City school systems sometimes have difficulty encouraging reliable contracting firms to take part in open competition. In periods of shortage and stress they are not certain if the school board will fulfill its moral obligation to help them reduce overhead and avoid costly delays. On the other hand, since the need for the school building presumably is urgent, there seldom is the opportunity to time bids for school construction on the basis of a favorable construction market. To avoid risk of collusion, it is wise to advertise so that bids are invited from widely scattered localities. Then there is no harm in inviting several experienced contractors to enter the competition.

The following quotation illustrates a form of advertisement to contractors: [2]

NOTICE TO CONTRACTORS

Separate sealed proposals for the:

General Construction
Heating and Ventilating
Plumbing and Sanitary and
Electrical

work for the Maple Hill School on Laurel Avenue, Grandville, Albany County, New York, will be received by the Board of Education, Union Free School District No. 6 of the Town of Easton, Albany County, New York, in the Board Room of Easton High School on Easton Avenue, Easton, New York, on July 5, 1949 until 8.00 o'clock p.m. (Eastern Daylight Time) at which time they will be publicly opened and read aloud.

The Information for Bidders, Form of Bid, Form of Contract including General Conditions, Plans and Specifications, Forms of Performance and other Surety Bonds may be examined at the office of James Davis, Architect, 123 Main Street, Weston, New York, and copies thereof may be obtained upon deposit of $50.00 for the General Construction Set, and $25.00 for each of the Mechanical Trades sets. Such deposit will be refunded to any bidder duly submitting a proposal with the required bid security upon the return of such copy in good condition within twenty (20) days after the opening of bids. One-half of such deposit will be refunded to each nonbidder upon return of copies in good condition.

The Board of Education, above named, reserves the right to waive any informalities in or to reject any or all bids.

Each bidder must deposit with his bid, security in an amount not less than five per centum (5%) of the base bid in the form and subject to the conditions provided in the Information for Bidders.

Attention of bidders is particularly called to the requirements as to conditions of employment to be observed and minimum wage rates to be paid under the contract.

[2] Division of School Buildings and Grounds, *School Building Projects—A Guide to Administrative Procedures*, New York State Education Department, Albany, N.Y., 1950, pp. 23–24.

Conditions of the general contract and notice to separate contractors, however, can stipulate that when award is made on the separate bids for these trades or branches they may be placed under the general contract. The general contractor can be paid a commission for his services as coordinator in this respect, but usually an estimate of his costs for managing the project will need to be included in his basic bid. Engelhardt concluded that it is possible to get good construction under the lump-sum-contract system, providing there is legal means for eliminating the undesirable bidders or rejecting their bids.[1]

Cost-plus contracts are applicable where the extent of the work or the ultimate cost cannot be foreseen with reasonable accuracy, as, for example, when a contractor undertakes to execute a plan of modernization, alteration, or addition to the existing plant according to working drawings and specification. A contractor operating on the cost-plus plan is reimbursed the amount expended by him in doing the work, and, for his own services, either a fixed sum agreed on in advance or a certain percentage of the amount expended. Thus the contractor is able to reduce his investment and does not have to overbid for contingencies. It is sometimes the practice to employ one or more time and materials clerks whose duty it is to keep a daily check on the payroll and materials received and to evaluate the work. The cost-plus method can be used for small or large projects. The architect supervises the work and is paid a percentage fee on total payments.

The cost-plus plan could have the same defect as the segregated-contract system, namely, that delays in scheduling the work of the different trades and lack of promptness in completing the work increase the owner's costs. The lump-sum general contractor risks his own profits with such delays and has a premium placed on his own efficient management. Obviously an intelligent choice among possible methods of contracting has to be made by the owner.

Advertising for Bids. Advertising for bids should pursue the reasonable business practice of reaching a number of responsible contractors and allowing them sufficient time to prepare close estimates. A hasty study by contractors of the plans and specifications for a project can result only in large contingency allowances and excessive proposals. The minimum time allowed for preparing bids should be two weeks; and in large or complicated work three weeks or longer are desirable. If extension of time for bidding becomes necessary, all bidders should be given at least two days' notice of the extension and encouraged to take full advantage of the extra time allowed. Exorbitant bids and bids made without competition ought to be promptly dismissed.

[1] N. L. Engelhardt and Fred Engelhardt, *Planning School Building Programs*, Bureau of Publications, Teachers College, Columbia University, New York, 1930.

sufficient net liquid assets, or assets readily convertible into cash, to enable him to stand any reasonable loss that might be sustained in carrying out his contracts.

Usually a bid bond or certified check in amount of a percentage of the maximum price bid is required to accompany the bidder's proposal. If the bid bond is a surety-corporation bond, it is likely that the bidder can pass the above tests. In any event he has given earnest of good faith to furnish a performance bond (surety bond) if awarded the contract.

An invitation to bid in accordance with plans and specifications is primarily a means of securing the lowest price for the product, but cognizance must be taken of the necessity of securing a builder of established integrity, technical skill, and financial responsibility. In fact, the controlling statutes of most states contain the phrase "lowest responsible bidder" in order that public agencies shall exercise discretion and reject bids of incompetent contractors. A liberal ruling on responsibility would construe the term not only as financially reliable but also as morally and technically adequate to the responsibility of furnishing sound value for the taxpayer's investment.

The owner has the right to reject all bids for a satisfactory reason. He should not do this, however, as a subterfuge in order to accept a bidder who did not submit his proposal before the others were made public, or as a device to obtain an estimate on the cost of a project and then proceed to award it in segregated contracts or possibly to a bidder definitely selected in advance, as these practices would be unethical and in most instances illegal. Selection is usually among the several lowest bidders or if a sufficiently responsible contractor is not found there, among the next lowest group.

When the award is made, the bid deposits should be immediately returned to the other bidders, as failure to do so harms the reputation of the school board. Action on bids received should be taken within three days, except in special cases for good cause, and in any event within ten days of receipt of bids.

Use of Alternates in Bidding. Alternate bids are requested where (1) a change in material or method gives promise of a satisfactory job at lower cost than the base specifications or (2) omission of some desirable but basically unnecessary feature is to be considered. Should alternate bids affect more than one trade, alternate bids ought to be taken on all and changes in the working drawings or structure noted on the plans. The specification of alternates is one way to keep bidding as open and competitive as possible. The material market and building conditions often favor one material or method over another, and competitive bid prices on alternates may control the final selection of such features as exterior wall facing, roof materials, floor and interior wall finishes, mechanical

No bidder may withdraw his bid within 45 days after the date set for the opening thereof.

Dated: June 10, 1949

Board of Education, U.F.S.D. No. 6
Town of Easton, Albany Co., N. Y.

By John J. Doe
President

Note. Separate bids for the four major contracts are required where cost of projects exceed $25,000 (*General Municipal Law, section* 88).

If only one responsible bid is received, the situation justifies rejection and readvertisement. Where it is suspected that, because of labor market, methods specified, or particular design, a single bidder is favored by the plans and specifications, they should be rewritten. Open competition and the sealed bid are proved ways of inducing contractors to submit lowest figures.

Investigation of Bidders (the "Responsible Bidder"). Usually a short time elapses between opening of bids and award of contract because of the necessity of tabulating and studying the alternates. The school board may expect the architect to investigate the low bidders in the interim and advise them as to their status and responsibility. The general contractor should be qualified to manage the complexities of scheduling the separate trades, assembling materials on time, securing skilled workmen, and executing the plan. Therefore he should be able to show some evidence of having administered comparable projects. His reputation can be established on his previous performances in similar work. The separate contractors should be technically competent in their trades and evidence ability to produce an acceptable product. The architect is entitled to know the subcontractors whom the contractor proposes to use since their competence is a part of the contractor's product. These are among the factors that indicate the moral and technical responsibility of low bidders.

The requirement that the bidder to whom the contract is awarded shall furnish surety bond covering contract compliance helps to screen the reputation of bidders, according to Linn and Joyner,[3] since the surety corporation must be satisfied that the contractor (1) is honest and reliable, (2) is experienced in the line of work for which he desires to be bonded, (3) is not overloaded with other work, (4) has no losing contracts on hand, (5) has ample plant and equipment, or the funds with which to purchase such needed items without impairing his working capital, (6) enjoys a good credit standing with banks and material men, (7) has made proper arrangements for financing his work, and (8) has

[3] Henry H. Linn and Schuyler C. Joyner, *Insurance Practices in School Administration*, The Ronald Press Company, New York, 1952.

37. Relations of contractor and subcontractor
38. Architect's status
39. Architect's decisions
40. Arbitration
41. Cash allowances
42. Use of premises
43. Cutting, patching
44. Cleaning up

The American Institute of Architects claims that its objective is to protect the interests of both the owner and the contractor. Its *Handbook* discusses the issues pertaining to each provision in the standardized general conditions.[5] Binding the American Institute of Architects' general conditions into the specifications does not relieve the school board and architect entirely from making important decisions.

The Institute has added the following list of supplementary general conditions that the specification writer may need to add to the general conditions of an individual contract. Parenthetical references after numbered items are to the general conditions listed above. Unnumbered items are cross references:

45. Alternates
46. Allowance, cash (art. 41)
47. Applications for payments (art. 24)
    Barriers, see 63.
48. Barricades
    Bonds, guaranty, see 67.
49. Bracing building during construction
50. Broken glass
51. Changes in the work (arts. 15 and 16)
52. Charges for extra copies of drawings
    Cash allowances, see 46.
    Chases, see 43.
53. Checking by surveyor and his certificate
54. Cleaning (additional to art. 44)
    Clearance of site, see 65.
    Completion, time of, see 106.
    Construction explanation, see 56.
55. Cooperation
56. Construction procedure
57. Contractor's right to stop work or terminate contract (art. 23)
    Contractor to lay out work, lines and levels, see 72.
    Contractor to work overtime if required, see 77.
    Coverings, protective, see 82.
58. Cutting and patching (art. 43)
    Delivery, roads for, see 65.
    Description of property, legal, see 73.
59. Discrepancies
    Drainage, see 65.
60. Drawings
    Elevators, temporary; hoists, see 69.
61. Errors and omissions
62. Examination of the site
    Explanation, construction, see 56.
    Explanation, specification, see 91.
63. Fences
    Freezing weather precautions, see 82.
64. Future extensions or additions

[5] *Handbook of Architectural Practice*, American Institute of Architects, Washington, 1958.

installations, or structural features. The architect must prepare a form of bidding that will clearly show the comparative quotations.

CONDITIONS OF CONTRACT WITH BUILDER

A relatively simple contract with the builder is binding, since most of the elements of the contract are contained in other documents. If the school board departs from the standard form of agreement such as that supplied by the American Institute of Architects, it should consult the school attorney on the provisions.

Outline of Generol Conditions. The drawings and specifications are essential elements of a building contract. Many conditions of general character are found in the agreement and in the specifications. Here the American Institute of Architects offers a widely used standardizing service in the form of a ten-page document covering forty-four articles of the general conditions of a contract for the construction of buildings. These forty-four conditions can be referred to, or better included, in the specifications as part of the bidding terms and contract.

The subject of the articles is as follows: [4]

1. Definitions
2. Execution, correlation, and intent of documents
3. Detail drawings and instructions
4. Copies furnished
5. Shop drawings
6. Drawings and specifications on the work
7. Ownership of drawings
8. Samples
9. Materials, appliances, employees
10. Royalties and patents
11. Surveys, permits, laws, and regulations
12. Protection of work and property
13. Inspection of work
14. Superintendence; supervision
15. Changes in the work
16. Claims for extra cost
17. Deductions for uncorrected work
18. Delays and extension of time
19. Correction of work before final payment
20. Correction of work after final payment
21. Owner's right to do work
22. Owner's right to terminate contract
23. Contractor's right to stop work or terminate contract
24. Application for payments
25. Certificates for payment
26. Payments withheld
27. *Contractor's liability insurance*
28. Owner's liability insurance
29. Fire insurance with extended coverage
30. Guaranty bonds
31. Damages
32. Liens
33. Assignment
34. Mutual responsibility of contractors
35. Separate contracts
36. Subcontracts

[4] Obtainable for 50¢: AIA Form A201, 1958 ed., *General Conditions*, American Institute of Architects, Washington.

Utilities altered, see 65.
Vault permits, see 79.
Warranty, guaranty, see 68.

107. Watchmen

Water, temporary, see 65.
Windstorm insurance, see 70.
Wiring, temporary, see 99.

Among the supplemental general conditions commonly found in specifications for major school-construction projects are (1) definition of site, (2) scope of work and plans for separate bidding, (3) work not in contract, (4) examination of premises, (5) local codes and ordinances, (6) temporary utilities, (7) shop drawings, (8) signs and advertising, (9) inspectors, (10) insurance, (11) bid bond or cashier's check, (12) performance bond, (13) contractor representations, (14) waiver of lien, (15) prevailing wage rates, (16) local labor, (17) reports, (18) payments, (19) temporary buildings.

The statement of conditions must comply with and fulfill state and local laws. The school board, architect, and contractor can avoid misunderstanding if the initial statement of general conditions is complete and practical. The specifications as a rule also contain an invitation to bid and a proposal form that the bidder is required to use.

Extras and Change Orders. Changes in the amount of contract are made upon order of the school board and can arise from such conditions as extra foundation work beyond that estimated from testpit observations, desired improvements in design or materials that are decided upon as the work proceeds, or extra features that did not occur to the school board before closing the contract. Occasionally the architect himself will order minor changes of a type that will not increase costs. A copy of the change order, based on a school-board resolution, is filed with the contractor, the owner, the architect, and the inspector, or clerk-of-the-works.

Extras and change orders are generally costly, time-consuming, and a source of annoyance. They introduce delays in the work of the trades and often postpone the entire construction schedule. If a change order is in the interests of long-range economy by meeting conditions unforeseen at the time of planning, it definitely should be entertained. As a rule, however, changes and extras after award of contracts are notoriously expensive and all parties should seek to avoid them.

With lump-sum contracts the added amount of cost for extras and change orders is negotiated. Extras can also be handled on the basis of cost-plus-percentage or of fee payments, if preferred. The agreement is written on a standard change-order form (usually furnished by the architect) which amends the contract.

Method of Contracting Renovation Projects. Simple building-renovation projects are usually bid on a material-plus-labor basis. School districts usually prefer cost-plus contracts for this type of work since this virtually makes the contractor an employee of the school district—a foreman on the job, an inspector, an advisor, and an expeditor.

65. General contractor's work
    Glass, broken, see 50.
66. Grades, lines, levels and surveys
67. Guaranty bonds (performance and payment) (art. 30)
68. Guaranty-warranty
    Heating during construction, see 98.
69. Hoists and temporary elevators
    Instructions, operating, see 75.
70. Insurance special (extended coverage, liability, limits, loss of use)
    Keeping building free from water, see 65.
    Ladders, see 102.
71. Lanterns and warning lights
72. Layout of work, lines and levels
73. Legal description of property
    Liability policies, limits of coverage, see 70.
    Liens, see 78.
    Lightning, insurance, see 70.
    Lights, see 71.
74. Liquidated damages or forfeitures
75. Manufacturer's directions—operating instructions
    Materials, see 68.
76. Measurements and dimensions
    Offices and equipment, see 100.
    Operating instructions, see 75.
77. Overtime work
    Patching, cutting and, see 58.
78. Payments (exceptions to arts. 23, 25 and 20)
    Permissions to use materials or methods other than as specified, see 65.
79. Permits (including vault permits)
80. Photographs, progress
    Privy, see 103.
81. Progress reports and estimates
    Protection of adjacent property, see 82.
    Protection of public property, see 82.
    Protection of trees and shrubs, see 82.
82. Protection of work, property, and public (art. 12)
    Protective coverings, see 82.
83. Pumping
    Roads for delivery, see 65.
    Ramps, see 102.
    Repair, contractor to keep work in, see 65.
84. Sales tax
85. Samples
    Sanitary conveniences, see 103.
86. Scaffolding
87. Separate contracts (art. 35)
    Sheds, see 101.
88. Shop drawing
89. Shoring
90. Sidewalks
91. Signs
    Site clearance, see 65.
    Site, examination of, see 62.
92. Smoking in buildings
93. Soil tests and analyses
    Special cleaning, see 54.
94. Specification explanation
95. Stoppage of work due to weather
    Storage spaces, see 101.
96. Subcontracts (art. 36)
    Surveyor, checking by; certificate, see 53.
    Telephone, see 104.
    Temporary buildings, see 101.
97. Temporary enclosures
98. Temporary heat
99. Temporary light, power, and wiring
100. Temporary office
101. Temporary storage sheds
102. Temporary stairs, ladders, ramps, runways and hoists
103. Temporary sanitary facilities
104. Temporary telephones
    Temporary water, see 05.
    Temporary wiring, see 99.
105. Tests
100. Time of completion

contract value as work is completed and materials delivered at the site. When work is substantially completed, a sum of 10 per cent is usually withheld for thirty-one days according to law and paid when the contract is fully performed and the contractor has submitted receipts for all bills and payrolls and release of lien by all subcontractors, vendors, and others involved. Final payment is made on certificate of the architect. Standard forms (such as AIA forms) are available for applications for payment and certificates for payment. Thus the architect exercises a close authority over the quantity and quality of the contractor's work.

SURETY BONDS

Since surety companies are instituted under regulatory and protective laws, it has become general practice to rely upon surety-company bonds rather than individual bondsmen. A surety bond is a tripartite contract in which the *surety* assures the *beneficiary* (owner) that the surety will fulfill the obligation of the *principal* (contractor) in the event that the principal fails to do so. Surety differs from a guarantee in that the surety becomes liable if the principal does not, rather than cannot, perform.

There are four common types of surety bonds in school construction:

Bid bond. The acceptance bid bond guarantees that if awarded the contract the low bidder will enter into the contract and furnish the final bonds required for performance and payment obligations, as prescribed in the general conditions. This bond has a limited liability, such as "an amount not less than five per cent (5%) of the largest possible total bid, all additive alterations being considered." Bid bonds accompany the proposals submitted by the bidders.

Frequently the bidder is given a choice of furnishing with each proposal submitted either a certified (cashier's) check or an acceptance bid bond made by a surety company. Since a certified check ties up the bidder's capital, the school board would be bound to return such checks to unsuccessful bidders promptly.

Performance bond. This is an assurance that the person or firm to whom the contract is awarded will faithfully perform the contract including all provisions of the plans and specifications. It is usually furnished in an amount not less than 100 per cent of the contract price since there is no economy in a lesser amount. The performance bond is not to be executed at a date prior to the date of execution of the contract between the owner and contractor. It must meet the approval of the owner.

Payment bond. This bond guarantees payment of all proper labor and material bills.

Owner's protective bond. This latter type of bond combines the features of the performance bond and the payment bond in a single instru-

As many of the general conditions as possible should be reduced to writing: starting and completion date, storage of materials, tools and labor quality, grade of construction, avoiding hazards, protection of property, local ordinances, insurance, payments, bonds, etc. Many city districts have a standard form of contract covering such conditions.

The simplest form of contract for renovation work is such as may exist in an informal exchange of correspondence: [6]

Window weatherstripping

Date ....

TO: . ...

(Board of Education and Address)

I, we propose to install in a workmanlike manner grooved window metal weatherstripping and to take care of minor repairs in accordance with the following specifications:

windows of approximately . in size and a sash thickness of ...... inches are to be weatherstripped. The metal strip is to be of ...... (Kind) metal alloy with .. .. (Gauge No.) at the sill and a ...... (Gauge No.) on the sides. Grooves are to be plowed in the upper and lower sash with the groove in the bottom rail of the lower sash to be well saturated with linseed oil before installing. The hook on the upper and lower sash is to be interlocking so as to exclude infiltration of air at the meeting of the rails. Felt bumpers are to be installed at the ends of the meeting rails. Any badly cracked or missing putty is to be renewed. Any broken or badly cracked glass panes are to be replaced. Any broken or badly worn sash supports are to be replaced with metal chains.

I, we, hereby agree to complete the weatherstripping and window repair in accordance with the above specifications at a total cost of $ .. . .
.. upper and . . . lower window sash need replacing which I will contract to do at $ .... per sash.

....
(Contractor)

....
(Address)

Of course, major projects would necessitate complete specifications and advertising for competitive bids. In any case the school district is responsible for inspection of the work.

Payment of the Contractor. The usual terms of the builder's contract provide for monthly payments in an amount equal to 85 per cent of the

[6] *School Plant Construction and Rehabilitation,* State of Ohio, Department of Education, Columbus, Ohio, 1951, p. 112.

Owner and Surety of the lowest responsible bidder, arrange for a contract between such bidder and Owner, and make available as work progresses (even though there should be a default or a succession of defaults under the contract or contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion less the balance of the contract price; but not exceeding, including other costs and damages for which the Surety may be liable hereunder, the amount set forth in the first paragraph hereof. The term "balance of the contract price," as used in this paragraph, shall mean the total amount payable by Owner to Contractor under the Contract and any amendments thereto, less the amount properly paid by Owner to Contractor.

Any suit under this bond must be instituted before the expiration of two (2) years from the date on which final payment under the contract falls due.

No right of action shall accrue on this bond to or for the use of any person or corporation other than the Owner named herein or the heirs, executors, administrators or successors of Owner.

The school board is counseled to send the surety company prompt notice of whatever contractor's default arises, or of changes in the amount or time schedule of the contract, since failure to do so may result in wasteful litigation.

Other forms of insurance besides surety bonds pertain to school-building projects. These include fire and extended coverage, workmen's compensation, public liability, property damage, insurance on contractor's tools and equipment, owner's contingent liability, and owner's contingent property-damage insurance. All except the last two, the owner's contingent liability and property-damage insurance, may be required of the major contractors, and of their subcontractors, in such amounts as are set forth by the school board in the general conditions of the specifications. Certificates of all insurance policies should be filed with the owner.

SUPERVISION OF THE PROJECT

An architect supplies extremely important supervision, but it is not always of the nature that school administrators would first assume. The architect does inspect the work but not continuously; he does test new materials but not all materials. The owner is responsible for continuous superintendence, whereas the architect guards against defects and deficiencies. Therefore the owner is advised to have a clerk-of-the-works approved by the architect to conduct constant on-the-job inspection and perform other duties of superintendence. In the standard (AIA) form of agreement between owner and architect a distinction is drawn between supervision such as the architect renders and superintendence:

The Architect will endeavor by general administration of the construction contracts to guard the Owner against defects and deficiencies in the work of

ment. While not acceptable for Federal contracts,[7] this form is used in school construction under various state laws. The American Institute of Architects publishes separate bond forms which they approve bound together in one document, thus protecting separately the different parties' interests (AIA Doc. No. A-311 (107) Performance Bond and Labor and Material Bond).

The use of corporate suretyship on the part of school districts has certain benefits. The surety becomes the guarantor of the contractor, extending its resources and credit to the contractor's undertaking for the benefit of the school district. Thus the surety company implies by its act that in its judgment there is slight possibility of sustaining loss. The building-contract bond is a positive guarantee that labor and material bills incurred in furthering the contract will be paid, and an assurance that the contract will be complied with in strict accordance with the plans and specifications. Premium rates on building-contract bonds are usually less than 1 per cent of the contract price, depending on the nature of the work, and the rate seldom exceeds that amount. The premium may be paid by the owner or the contractor. The contractor benefits by his improved credit position, especially in securing materials.

Surety companies in most states are restricted, as are banks, in the amount for which they may accept responsibility on any one risk, and therefore on large contracts there should be a cosurety or a certificate of reinsurance in properly licensed companies.

The usual statutory requirement is that a contractor on public works, since public agencies are not lienable as is private enterprise, must furnish payment (surety) bond in an amount not less than half the contract price so as to guarantee payment for all labor and material used on public-works projects in excess of a nominal amount.

The standard form of *labor and material payment* surety bond approved by the American Institute of Architects after binding the surety contains these provisions:

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that, if Contractor shall promptly and faithfully perform said contract, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

The Surety hereby waives notice of any alteration or extension of time made by the Owner.

Whenever Contractor shall be, and declared by Owner to be in default under the Contract, the Owner having performed Owner's obligations thereunder, the Surety may promptly remedy the default, or promptly .

1) Complete the Contract in accordance with its terms and conditions, or

2) Obtain a bid or bids for submission to Owner for completing the Contract in accordance with its terms and conditions, and upon determination by

[7] Miller Act (1935) requires dual bonds.

tion of damage to school property through carelessness; inspection of the quality of concrete or bonding materials and proper imbedding of reinforcements; supervising the location of conduit and other mechanical installations in accordance with plan; approving the contractor's design according to architect's instructions where working drawings are incomplete or ambiguous; tallying the time schedule of contractors to facilitate cooperation; maintaining prompt liaison with school board and architect whenever difficulties arise; enforcing the school board's obligations in such respects as making space available for the builders; general administration of the school board's established policies relating to school-plant supervision; and cooperation with municipal agencies having construction jurisdiction. The specific duties assigned the on-the-job office of the clerk-of-the-works will depend on the type of project and the method of contracting. If the material and labor cost plus contractor's fee or the segregated-contract methods are adopted, the clerk-of-the-works may virtually serve as project manager and coordinator.

CHECK LIST OF GENERAL DUTIES OF AN INSPECTOR, OR CLERK-OF-THE-WORKS

1. Preserve agreeable relations among all those concerned with the work—exercising diplomacy and tact, instilling a feeling of pride in doing things well, and helping to solve difficulties.

2. Acquaint himself thoroughly with the drawings and specifications, the applicable laws, ordinances, rules and regulations, the bulletins from the architect's office, and the quality of materials and workmanship specified—so as to be able to interpret accurately and pass correct judgment. The clerk-of-the-works must be well enough informed to anticipate problems before they arise.

3. Prepare schedules of quantities of materials and when they will reach the site (or verify the contractor's schedules).

4. Prepare a time schedule establishing the sequence and proper progress of operations under the different trades. (A progress report on such a schedule is illustrated in the next chapter.)

5. Inspect materials, workmanship, measurement of lines and levels, and extras. Bear in mind that he has no authority to relax or nullify the provisions of the contract documents.

6. Report promptly to the architect all irregularities in the performance of the contract.

7. Maintain an office on the site where records, drawings, and correspondence are kept in orderly fashion for instant reference and where bulletins or other reminders are plainly posted.

8. Submit a daily report [8] to the architect on the form he supplies, covering

[8] Examples of daily reports of the clerk-of-the-works appear in *Handbook of Architectural Practice*, American Institute of Architects, Washington, 1958, and printed forms supplied by architectural firms.

contractors, but he does not guarantee the performance of their contracts. The general administration of the Architect is to be distinguished from the continuous *on-site inspection* of a Project Inspector.

When authorized by the Owner, a Project Inspector acceptable to both Owner and Architect shall be engaged by the Architect at a salary satisfactory to the Owner and paid by the Owner, upon presentation of the Architect's monthly statements.

The Architect's Supervision. The architect sees that the building dimensions are correct and that it is properly oriented on the plot from the beginning of construction. He keeps a schedule of the work and adjudicates differences among the contractors. He supplies instructions and detail drawings where needed in addition to the contract drawings; and he inspects the shop drawings, e.g., for steel work, cabinet work, or setting drawings for terra cotta, with minute care. He is a consultant to the contractor on materials measurements and many other details.

He establishes a schedule of values and against it checks the contractor's claim for periodic payments on a percentage of work done; thus he certifies all payments to contractors. He arbitrates controversies arising out of the contracts. He handles change orders affecting the amount of contract. He coordinates the work of other inspectors.

It is clear that these tasks are of an executive and supervisory character. Ultimately the architect's reputation is at stake, and he tries to see that his client, the school district, receives maximum value in the project. Acceptance of the product and final payment to the contractor are formally certified by the architect after final inspection.

The Clerk-of-the-works. For any except very small projects the school board should engage an inspector, or clerk-of-the-works, approved by the school architect. The clerk-of-the-works exercises continuous survelliance and is present on the ground throughout all working hours to examine materials and workmanship, verify compliance with drawings and contract conditions, keep records, and report anticipated difficulties.

An inspector, or clerk-of-the-works, should be a person who has practical knowledge of construction, practical engineering, architecture, and accounting. That he must possess personal reliability, wisdom, thoroughness, and tact is plainly seen in consideration of his manifold duties. An inspector, or clerk-of-the-works, will earn his salary in cost savings alone since he is in a position to detect substitution of faulty materials or slipshod workmanship that might otherwise be covered up and hidden in the course of construction. In some areas the school boards have required the school architect to employ an engineer for major projects.

Among the many details placed under superintendence of an inspector, or clerk-of-the-works, are these: enforcement of public safety; preven-

acceptance of contracts, performance of contracts, and guarantee of payments by contractors. Other insurance may be required to be carried by the contractor.

An architect's relations begin early in a school-plant program and extend beyond the termination of the contractor's work. He furnishes essential supervision. On major construction enterprises, however, a school board is advised to protect its interests by employing an inspector, or clerk-of-the-works, on the job. This inspector is under the architect's supervision, and he assures constant surveillance of the work.

DISCUSSION PROBLEMS

1. Demonstrate the advantages and disadvantages of taking bids on alternates. Discuss specifying "acceptable equivalents."
2. By means of a sociodrama, represent the functions of the school architect in arbitration proceedings (refer to AIA Document 305, *Standard Form of Arbitration Procedure*).
3. What factors must the architect verify before issuing a certificate of final payment on behalf of the contractor?
4. Contrast supervision as exercised by the architect and inspection as provided by the school board. How much engineering skill is required of the clerk-of-the-works?
5. Prepare an adequate system of records to be kept by the clerk-of-the-works on a major construction project.
6. State the normal business procedures involved in receiving and taking action on school-construction bids.
7. What insurance is normally required in a construction project and who is responsible for purchasing it?
8. Prepare a set of general conditions to be included in the proposal and contract for renovation projects performed on a cost-plus basis.
9. Investigate several cases of change orders authorized in the course of school-construction projects. Did they increase the cost, and if so by how much?
10. How does the school board protect its interests against failure of the builder to produce the expected results? Also, what cooperation should the school board extend the builder to encourage him to produce superior results?

RELATED READINGS

American Institute of Architects: *Handbook of Architectural Practice*, Washington, 1958 (on contracts).
Association of School Business Officials: *Contract Bond Manual for School Districts*, Bulletin no. 14, Kalamazoo, Mich., 1950.
Blundell, W. I.: "The Clerk of the Works in a Schoolhouse Construction Program," *American School Board Journal*, 124:41 ff., April, 1952.
Crone, J. M.: "When—A Performance Bond," *American School Board Journal*, 131:38 ff., December, 1955.
Eifler, Carl, and F. W. Hosler: "A Checking List for the Contract between a Board of Education and a Building Contractor," *Thirty-third Yearbook*, Na-

classifications of labor on the job, status of materials, work done, visitors, and forthcoming needs.

9. Prepare progress reports by means of graphs, photographs, or dated lines on blueprints and elevations.

10. Aid in checking applications for monthly payments on the basis of a schedule of percentage of work done. The schedule of values prescribed in the general conditions of the contract gives a value for each part of the work which can be divided by total quantities of that part as number of thousands of bricks, cubic yards of concrete, or number of tons of steel incorporated into the building.

11. Keep a detailed financial account of the capital-improvement fund where the business manager of the school district chooses to delegate to him this bookkeeping function.

The most rigid inspection will be no substitute for the skilled mechanic and a capable, conscientous contractor. But serious defects occasionally have developed in school projects after the occupation of the building as a result of untested materials or concealed construction faults. Defects of this character are attributable to insufficient inspection during construction of the project. Such defects usually constitute safety hazards and they entail costly maintenance repairs.

Authorities therefore agree upon warning school boards that they will be negligent of their interests if they fail to budget full-time on-the-job superintendence of the works.

SUMMARY

Although the architect will prepare and execute specifications, the school board must approve the method of receiving bids. The common practice is to let a lump-sum general contract since this assigns management of the project to the contractor who usually is the best qualified for this function. He will, of course, include both the cost of his services and allowance for contingencies in his bid price. Laws of several states require that separate contracts be let for general construction, heating and ventilating, plumbing, and electrical work. It is well to have the general contractor coordinate these branches.

Competitive bidding is to be encouraged. The contracts should be awarded to responsible bidders, usually determined by the architect's investigation. Frequently an architect may specify alternate bids to get the best material, methods, and price for a job.

The general conditions specified in a construction contract are fairly standardized. They need to be in conformance with applicable laws and should be amended to cover exact circumstances of a project. Even where renovation projects are let on a materials and labor basis, the general conditions of a contract should be stated as completely as practicable. Change orders are negotiated as necessary after contracts are let, but they often prove to be expensive. As the work progresses, contractors are paid periodically upon certification of the architect according to an agreed schedule of values.

Surety bonds are a means of protectiog the school district with respect to

CHAPTER 20

Advancement to Occupancy

Just as a long-range school-building program depends for its soundness upon having ample time for study and planning, so too a satisfactory building project requires considerable time for its production after educational specifications have been prepared. In the meantime the school administrator may have difficulty in accommodating his school enrollment, and unnecessary delays could disrupt the ongoing school program. Although some causes of delay are beyond the school administrator's control, he can do much to expedite progress of a building project through scheduling, anticipating certain causes of delay, providing for necessary progress records and reports, anticipating the furniture and equipment needs, and arranging for their delivery at the proper time. Among other administrative details to be handled prior to initial occupancy are naming of the school, selection and orientation of its staff, providing for final inspection, adjustments, and acceptance, planning the formal opening, and completion of property records.

TIME SCHEDULE

The time required to advance a project to occupancy depends upon a number of variables: the size and scope of the project, the complexity of the educational specifications, the size of architectural staff assigned to the project, the characteristics of a particular site, the type of construction, and the size and efficiency of the firms awarded contracts.

The attainment of an efficient and economical design requires that sufficient time be reserved for preliminary planning by the architect. If educational specifications are ready before preliminary planning begins and if the educational specifications are simple, clear, and specific, the time consumed in conferences between the educational staff and the

tional Society for the Study of Education, Public School Publishing Company, Bloomington, Ill., 1934.

Elliott, R. T., and J. H. Corson: "Segregated vs. General Bids," *American School Board Journal*, 120:33 ff., January, 1950.

Hobbs, Clarence W.: *Workmen's Compensation Insurance*, McGraw-Hill Book Company, Inc., New York, 1939.

Linn, Henry H., and Schuyler C. Joyner: *Insurance Practices in School Administration*, The Ronald Press Company, New York, 1952.

Lunt, Edward C.. *Surety Bonds*, The Ronald Press Company, New York, 1930.

Muelder, Wallace R.: "Legal Procedures for Competitive Bidding," *Nation's Schools*, 55:98–104, February, 1955.

Parker, William S.: "School Building Contracts," *American School Board Journal*, 128:70, May, 1954.

Roach, Stephen F.: "School Board Members and Construction Contractor's Bonds," *American School Board Journal*, 128:58–59, January, 1954.

Tyler, James W.: "Elements in a Satisfactory School Building Contract," *American School Board Journal*, 128:40 ff., January, 1954.

Wentz, George R.: *Fidelity and Surety Bonding*, Lee Company, St. Paul, Minn., 1939.

sufficient time for organizing the studies and planning involved in educational specifications, for the preparation of such specifications, and for their consideration and approval by the school board.

The legal study and planning should begin at the time the site is acquired and work started on educational specifications. Every possible legal complication or step should be anticipated well in advance. Many delays could be avoided by taking steps to avoid law suits and by making thorough preparation to obtain required legal authorizations and approvals.

The finance inquiries, budget preparation, and financial planning should be going on at the same time. A school administrator can have the best imaginable educational specifications but not be able to incorporate them into the plans for the project because of inadequate finance. However, the lack of finance could result from insufficient study and planning as well as from true lack of fiscal capacity.

Uncontrollable causes of delay should be allowed for in making the time schedule for completion of a project. Some legal actions arising out of site acquisition and construction cannot be entirely anticipated or avoided. Labor disputes may arise on the job, or where they involve the whole construction industry of an area, they can affect a particular job. The volume of construction in other parts of the nation can cause shortages of labor and materials that would delay the project. Strikes in another industry, such as in steel production, can delay the delivery of materials to the site. Bad weather at certain stages in the work can stop or slow down work. In planning a time schedule for a given project, probably at least three months' leeway should be allowed for these contingencies. At certain times even a longer period of leeway may be indicated.

Preparation of Schedule. The school administrator in cooperation with his specialist staff (legal counsel, building consultant, architect) should prepare a time schedule for the project which can be revised in light of progress at various stages. Among other important purposes this schedule will show the probable timing of financial demands upon the school district. An outline such as Table 20-1 might be used, depending upon the conditions existing in the particular locality.

PROGRESS RECORDS AND REPORTS

The necessity of keeping records of all decisions made during the process of planning and advancing a project has been emphasized. Records and reports are necessary to control and expedite progress.

One method of graphically reporting on progress is to prepare a large master chart listing each step (Figure 20-1). By means of bars or other

architectural staff will be reduced. Nevertheless, time is required for conferences, revisions, study, and approval. Except for very small projects, it can be anticipated that careful preliminary planning by the architect may require from three to six months. To rush the planning time (less than three months) may result in a design which is not best for the particular problem and future utilization.

Once the preliminary plans have been agreed upon and approved, generally at least five or six months have to be allowed the architect for preparation of final working drawings and specifications and for their approval by the school board. The actual time required will depend upon the size of the architectural firm and the other jobs upon which they are working at the time. One of the major considerations in hiring an architect is the ability of his office to proceed with this phase of planning and to complete it within a length of time agreed upon as reasonable for the particular project.

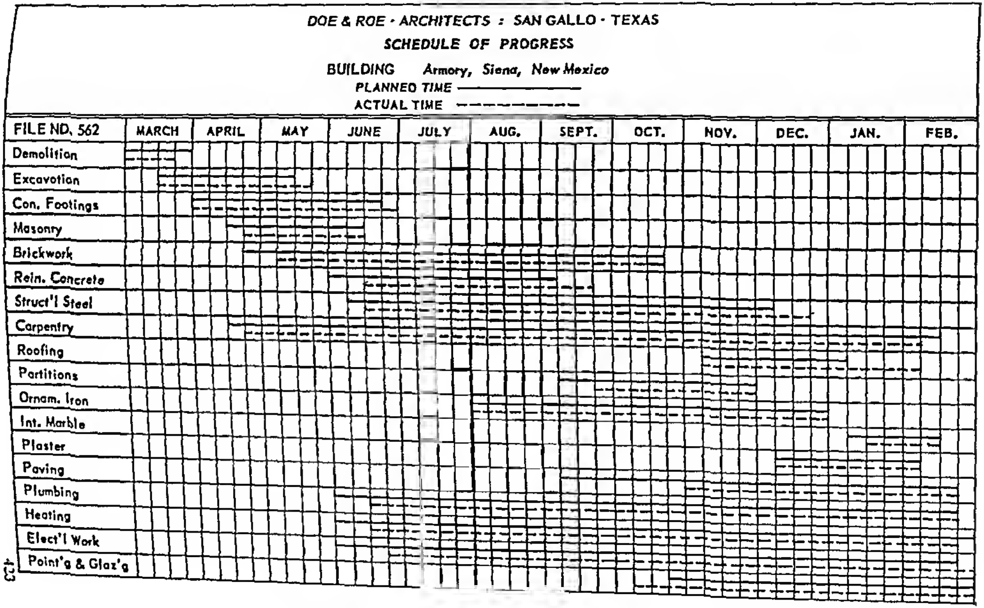
At least a month has to be scheduled for the advertising, processing, and acceptance of bids. If possible, the previous steps should be timed so that construction can begin immediately after the bids are accepted. In many areas weather will be a dominant factor in this phase of the time schedule. Generally a year to a year and a half will be required for completion of construction. Thus the total time required from the start of preliminary plans to completion of the project will doubtless range from nearly two years to somewhat over two years.

Causes of Delay. The causes of delay in school construction can be divided into controllable factors and fortuitous ones. Among those which can be controlled and expedited within limits at least are delay in site selection and acquisition, site clearance and preparation for construction, preparation and approval of the general scope, preparation and approval of educational specifications, employment of legal counsel and architect, certain legal difficulties which could be anticipated and avoided, legal authorizations and approvals, provision for finance, budgeting adequate time for conferences with the architect during preliminary-planning stages, approval of preliminary plans and working drawings and specifications, advertising, processing, and accepting bids, executing contracts, and the timing of the start on construction.

The importance of test borings and architectural advice in selection of sites has been mentioned previously. The selection and acquisition of some sites should be completed at least a year in advance of the scheduled date for starting construction. This is essential where there are extensive problems of site clearance, grading, access, and utilities needed during construction.

The general scope of the project should be approved at least a year before the date set for preliminary planning by the architect. This allows

Fig. 20-1. Charting the progress of construction. (Handbook of Architectural Practice, American Institute of Architects, Washington, 1958.)



symbols, progress is recorded daily, weekly, or monthly. Vertical bars or other symbols indicate the date upon which a step is completed. Where work is under way but not completed, other types of bars or symbols are used to represent the extent of progress of a given date. Where several projects are under way at one time, the data are shown separately for

Table 20-1. Illustrative Time Schedule for a School-plant Project

Step or stage	*Start*	*Time budget (months)*	*Complete*
1. Site selection and acquisition	4/ 1/56	2–6	10/16/56
2. Preparation and approval of scope	10/16/56	1–2	12/16/56
3. Preparation and approval of educational specifications	12/16/56	6–12	12/16/57
4. Legal study, planning steps, authorizations, referendums	12/16/56	6–12	12/16/57
5. Financial study, budget, and planning	12/16/56	6–12	12/16/57
6. Employment of architect	10/16/57	5	2/16/56
7. Site clearance	12/16/57	6–12	12/16/56
6. Preparation and approval of preliminary plans	2/16/56	3–5	6/16/56
9. Preparation of site for construction	6/16/58	6–7	1/16/59 *
10. Preparation and approval of working drawings and specifications	6/16/56	6	12/16/56
11. Advertising, processing, and accepting bids	12/16/56	1	1/16/59
12. Construction	1/16/59	16 †	6/16/60 *
13. Selecting, ordering, and providing furniture and equipment	6/16/59	12	6/16/60
14. Selection and orientation of staff	9/ 5/59	12	9/ 5/60
15. Site development	2/16/60	6	6/16/60 *
16. Preparation for initial occupancy	3/ 5/60	6	9/ 5/60
17. Inspection and adjustments prior to acceptance	4/16/60	4 †	6/16/60
16. Preparation for and formal opening	5/16/60	3	6/16/60

* Depending upon climate.

† Including allowance for contingencies (delays). See also the architect's time schedule for construction contained in the agreement.

each project. The chart itself may aid in reporting progress to the school board and staff. Reproductions of the chart could be used for publicity.

The school administrator should require periodic reports from all staff employed by the board of education who are engaged in activities connected with the project, such as purchasing equipment, employing staff, certifying payments, etc. These provide a basis for reporting to the school board and the public. The fact that reports are required at stated intervals

not be excluded by this method. Other suppliers may submit specifications and demonstrate samples to establish the equivalent worthiness of their products, while the school district has protected the character and durability of the product it requires.

Advertising, receiving bids, letting contracts, inspection, and acceptance of educational equipment and furniture follow business procedures very similar to those of major construction contracts. The school district should specify the conditions of the transaction. These may be fairly simple statements or quite lengthy, but should cover at least delivery dates, destinations, shippings costs and methods, discounts, guarantees, and such protective bonds or assurance as may be required.

The school administrator not only must allow sufficient funds in his project budget for whatever additional furniture or equipment will be required, but also he must establish business procedures which will assure the use of the facility on its opening. This involves a complete inventory of available stocks and a determination of which items are to be moved to the new structure. It also implies that specifications will be drawn up for the refinishing, repair, and reconditioning of such materials; that the work will be started in time to have it ready on moving day; and that plans will be made for labeling the items to be moved and moving them to the designated place in the new facility on or before a specific date.

Orders for new equipment and furniture should be placed long before the building is to be completed if delivery is to be expected in time. Failure to have materials delivered before opening date may force the purchase of expensive or unsatisfactory substitutes.

The purchase of new equipment not only requires the application of sound business procedures but also involves planning. If delivery must be accepted on a certain date regardless of delays in other phases of the project, has provision been made for insurance and storage? Have shipping instructions been prepared which will assure that materials needed for a certain unit will arrive together and not involve a great deal of sorting of unrelated items which belong in different places?

STAFF PREPARATION

Even more important than having the facility completely equipped and furnished on opening day is having it staffed and organized for effective work. The staff must be selected, organized, oriented, and ready for their respective responsibilities before occupancy. As in the case of furniture and equipment the faculty for a new facility generally will be made up of those transferred from other schools and those employed for the first time. At least a year before the date of occupancy the school administrator should begin to plan the program and schedule for the new building. He

stimulates individuals or committees to show progress from one report period to the next. Thus tbe school administrator is in a position to analyze the causes for delay and take appropriate action to correct adverse conditions.

EQUIPMENT AND FURNISHINGS

The selection of new instructional equipment and furniture and the utilization of available items in the new facility are integral parts in the preparation of educational specifications for a project. It is not ordinarily a responsibility which should be delegated to the architect. Those who are responsible for educational operations should recommend what furniture and equipment are required to carry on their work effectively. However, it is appropriate to use the resources of educational specialists having broad experience and also the advice of the school architect to aid the school staff in making sound decisions. The architect with the assistance of interior decorators and with the approval of the school authorities should probably prepare the specifications for noneducational equipment and furnishings, particularly those items which are an integral part of the structure, such as auditorium seating, stage equipment, curtains, shades, folding bleachers for gymnasium use, kitchen equipment, lockers, and the like. Movable furniture and equipment provide greater flexibility and adaptability than built-in furniture and equipment and generally should be given preference in planning.

Educational equipment (and furnishings) as used here includes more than classroom items. It includes the offices, library, special rooms, and every piece of equipment or furniture selected to carry out or to facilitate the activities of the personnel of the school. Standards for selecting educational equipment and furniture are beyond the scope of this treatment, but much has been written upon the subject and may be easily located through *Education Index* and classified bibliographies.

The process of specifying and ordering educational equipment and furniture for a new school plant is often delegated to the school administrator and his staff. Ordinarily the vendors should be invited to bid in open competition. In fact, the laws of some states require such competitive bidding. While the supplier should be responsible, as well as low bidder, there is no reason to believe that one manufacturer or supplier has a corner on quality merchandise.

In writing specifications the school administrator has a choice between custom design or institutional standard items. As a rule the institutional standard equipment or furniture is more economical and satisfactory since it is mass produced and also tested. Such items may be specified by number from a certain manufacturer's catalogue (catalogue of a given year) "or equivalent." With proper care, open competition will

the contractors have fulfilled their contracts, the facility is ready for final inspection.

Prior to issuance of final approval, the school administrator and the school board should make an over-all inspection in the company of the architect and the contractor. They should cover the building completely in order to see at first hand what they have accomplished and to assure themselves that the building is complete before final acceptance of the building. Upon acceptance, the school system can begin to prepare the structure for occupancy.

Immediately after occupancy all personnel should be instructed to report flaws, defects, and unsatisfactory conditions. Frequent inspections should be made of the facility and its mechanical features. If defects are discovered, prompt action should be taken to prevent further damage, for example, from leaks. All reasonable precautions should be taken. Matters which can be traced to faulty materials or workmanship should be reported to the contractor at once and before the guarantee period has expired.

The contractor may receive the full balance of payment due under the terms of the contract where (1) proper bond and guarantees are furnished, (2) the work has been satisfactorily completed, (3) the legal period for claims has expired, (4) evidence is submitted that bills and payrolls have been paid, and (5) release of liens and rights of lien is furnished by the contractor if the owner so requests.

OTHER ADMINISTRATIVE DETAILS

There are a number of other administrative matters which have to be taken care of in connection with occupying the project. What name shall be given the school? What dedication ceremonies or other public relations activities shall be undertaken? What about insurance?

Naming the School. The name or designation of the school should be decided upon as early as possible in the planning stages. It serves a very important function in public relations and tends to give the school its personality. Public, staff, and student participation in selecting an appropriate name adds to these values.

Dedication. It is customary to conduct an open-house inspection or dedication ceremony upon completion of major projects. The taxpayer is entitled to a full knowledge of the investment for which he may be paying many years in the future, and also he is concerned with the educational program he supports. The architect, engineer, and educator have devoted their full creative energies to the planning of the project, and they will want the users to understand the detailed provisions of the completed project.

should decide what staff members from existing facilities are to be transferred to the new unit. He should know what positions will have to be filled and proceed to find qualified persons for each such position.

At the same time that the staff is being recruited and selected, a program should be planned for preparing and orienting the staff of the new building. Materials to be used in such preparation or orientation should be written and duplicated. Staff meetings for groups and the faculty as a whole should be planned. The faculty should report at least a week before the opening date to help get the facility ready for operation. With a schedule prepared in advance, books, supplies, and other teaching materials on hand, furniture and equipment in its proper place, and other details worked out, there is no reason why a new facility cannot be operated as efficiently and quickly as an established unit.

As soon as a core of faculty has been selected, student orientation could be initiated. Indeed a skeleton of a student organization could be created to aid in preparing handbooks, brochures, signs, and other materials necessary for orienting pupils to the new facility. Publicity releases, meetings, conferences, and other means can be used to acquaint students with the program and activities to be carried on.

In the orientation of faculty and students it is necessary to prepare instructions for the use of special features of the new facility—ventilation and heat control, control of movement of groups, cafeteria program, parking areas, entrances and exits, safety features, and other matters.

The custodial and janitorial staff should be employed in advance of the opening date and given thorough preparation in the proper care, cleaning, and operation of the facility and its various mechanical features. Manufacturers' representatives may be asked to prepare instructions for this purpose.

INSPECTION AND ACCEPTANCE

A facility is seldom ready for occupancy when the work is substantially completed. Until the final adjustments or corrections have been made, the school system normally should not occupy the premises. Yet from a legal viewpoint the date of substantial completion is important in that contractor's liability for faulty materials or workmanship generally starts from the date of substantial completion and usually extends for a year.

Both the architect and the administrative staff should be alert to jobs not finished, specifications not complied with, failure to provide items specified, and other details needing attention. The school administrator should keep his own list of shortages and confer with the architect about their completion, adjustment, or correction. The architect also will have a list. After the school administrator and the architect are satisfied that

should be carefully stored in a fireproof place. Indeed with modern facilities for duplication of such records, more than one copy should be prepared and stored in a different place as further protection against loss. Since difficulty is occasionally encountered later on in obtaining corrected copies of these drawings and specifications from the architect, he should not be paid in full before he has delivered the agreed-upon number of copies in proper form together with such other documents as guarantees, operating instructions or manuals, parts lists, and information relating to mechanical systems and equipment. These should be preserved permanently with the copies of all contracts, bonds, deeds, resolutions, legal authorizations and documents, and similar business records.

SUMMARY

The time span from initial studies to final occupancy of a school-plant project can be scheduled in advance. While delays are to be anticipated all along the way, a good sense of timing will enable the school administrator and the school board to launch every necessary action sufficiently in advance to assure sound business procedures without interrupting other parts of the work. Such a time schedule is useful in gauging progress, keeping the public informed, and financial planning.

Concerning educational equipment and furnishings, the educational planning, specifying, taking bids, awarding contracts, and management of property will follow lines quite similar to plant construction, except that generally the school administrator and his staff rather than the architect make the selection and frequently handle business details. However, the architect will be expected to specify the noneducational equipment and furnishings.

Selection of the faculty and preparation of administrative plans for the school-plant utilization can as a rule be made prior to final inspection and acceptance. Then, after final approval by the architect, school board, and administrator, the initial occupancy is ready to take place. The school district is expected to enforce its guarantees. Occupancy marks the occasion for naming the school, for dedication ceremonies, for completion of property records, and for establishment of proper community relations.

DISCUSSION PROBLEMS

1. Is it better for the architect or the school administrator to specify and purchase the school furniture? If the architect does it, the fee recommended by the Texas Society of Architects (AIA) being 10 per cent, should he be encouraged to design custom furniture or specify selected standard-manufactured furniture?
2. In purchasing desks and chairs where can standards be found for meeting the physical requirements of children of different ages and sizes?

If the dedication ceremonies are to serve this intended purpose, the event should be carefully planned and coordinated with the total program of informing the public about the facility and its use. A committee should be appointed long in advance of the date for the ceremony, and all details should be as carefully planned as for any other major public event sponsored by the school system. All persons who have had a part in planning, approving, building, or making possible the facility should be invited. The actual ceremony of the school board accepting the building from the contractor is the center of attention, but what makes it meaningful as a public relations instrument is the interpretation of the place of the school in community life, which can be made a part of the program.

Representatives of the community, the school board, the faculty, and the student body could contribute much to community understanding through their part in the program. An open house with well-informed school-board members, faculty members, and students as guides would contribute to public understanding of what the facility provides and why.

A printed brochure summarizing the highlights of the facility should be distributed to all guests or visitors. It is most important that the school authorities express their gratitude to all who made the facility possible, especially the taxpayers. Since there is a wide variety of content and taste displayed in school-dedication brochures, the school administrator may wish to make a collection of them for reference in meeting his own situation.

Insurance. The kind of insurance or protection which a school system should have prior to occupancy was previously discussed. Before final acceptance and occupancy, the school administrator should initiate action to provide the type of insurance protection for the new facility which the system provides for its other properties.

PROPERTY RECORDS

At this time a description of the completed building or other improvement and school site should be added to the property records of the school district. This ledger is a cumulative *property register* having the following column headings: building or equipment items, code, date of acquisition, original cost, estimated value at beginning of year, additions, replacement and repairs, deductions or losses, depreciation, estimated value at end of year. All equipment and furniture should be posted in the property ledger.

Copies of the working drawings and specifications as finally amended will be required for repairs, alterations, aod additions in the future and

should be carefully stored in a fireproof place. Indeed with modern facilities for duplication of such records, more than one copy should be prepared and stored in a different place as further protection against loss. Since difficulty is occasionally encountered later on in obtaining corrected copies of these drawings and specifications from the architect, he should not be paid in full before he has delivered the agreed-upon number of copies in proper form together with such other documents as guarantees, operating instructions or manuals, parts lists, and information relating to mechanical systems and equipment. These should be preserved permanently with the copies of all contracts, bonds, deeds, resolutions, legal authorizations and documents, and similar business records.

SUMMARY

The time span from initial studies to final occupancy of a school-plant project can be scheduled in advance. While delays are to be anticipated all along the way, a good sense of timing will enable the school administrator and the school board to launch every necessary action sufficiently in advance to assure sound business procedures without interrupting other parts of the work. Such a time schedule is useful in gauging progress, keeping the public informed, and financial planning.

Concerning educational equipment and furnishings, the educational planning, specifying, taking bids, awarding contracts, and management of property will follow lines quite similar to plant construction, except that generally the school administrator and his staff rather than the architect make the selection and frequently handle business details. However, the architect will be expected to specify the noneducational equipment and furnishings.

Selection of the faculty and preparation of administrative plans for the school-plant utilization can as a rule be made prior to final inspection and acceptance. Then, after final approval by the architect, school board, and administrator, the initial occupancy is ready to take place. The school district is expected to enforce its guarantees. Occupancy marks the occasion for naming the school, for dedication ceremonies, for completion of property records, and for establishment of proper community relations.

DISCUSSION PROBLEMS

1. Is it better for the architect or the school administrator to specify and purchase the school furniture? If the architect does it, the fee recommended by the Texas Society of Architects (AIA) being 10 per cent, should he be encouraged to design custom furniture or specify selected standard-manufactured furniture?

2. In purchasing desks and chairs where can standards be found for meeting the physical requirements of children of different ages and sizes?

If the dedication ceremonies are to serve this intended purpose, the event should be carefully planned and coordinated with the total program of informing the public about the facility and its use. A committee should be appointed long in advance of the date for the ceremony, and all details should be as carefully planned as for any other major public event sponsored by the school system. All persons who have had a part in planning, approving, building, or making possible the facility should be invited. The actual ceremony of the school board accepting the building from the contractor is the center of attention, but what makes it meaningful as a public relations instrument is the interpretation of the place of the school in community life, which can be made a part of the program.

Representatives of the community, the school board, the faculty, and the student body could contribute much to community understanding through their part in the program. An open house with well-informed school-board members, faculty members, and students as guides would contribute to public understanding of what the facility provides and why.

A printed brochure summarizing the highlights of the facility should be distributed to all guests or visitors. It is most important that the school authorities express their gratitude to all who made the facility possible, especially the taxpayers. Since there is a wide variety of content and taste displayed in school-dedication brochures, the school administrator may wish to make a collection of them for reference in meeting his own situation.

Insurance. The kind of insurance or protection which a school system should have prior to occupancy was previously discussed. Before final acceptance and occupancy, the school administrator should initiate action to provide the type of insurance protection for the new facility which the system provides for its other properties.

PROPERTY RECORDS

At this time a description of the completed building or other improvement and school site should be added to the property records of the school district. This ledger is a cumulative *property register* having the following column headings: building or equipment items, code, date of acquisition, original cost, estimated value at beginning of year, additions, replacement and repairs, deductions or losses, depreciation, estimated value at end of year. All equipment and furniture should be posted in the property ledger.

Copies of the working drawings and specifications as finally amended will be required for repairs, alterations, and additions in the future and

Index

3. Gives examples of specification writing for school furniture and equipment. What is the function of the term "or equivalent"? How can a school administrator be assured that the lowest bid is not below the desired quality?

4. At what stages in purchasing furniture and equipment should the school personnel be invited to participate? What general criteria should govern their recommendations?

5. Prepare an invitation to bid, rules for bidding, and statement of general conditions to accompany furniture and equipment specifications on which formal bids are to be received.

6. The project time schedule should provide ample opportunity to select, purchase, and assemble furniture and equipment because generally there is pressure to occupy a building as soon as the construction is completed. What provisions may the school administrator make to assure correct delivery date, storage, inspection, and distribution of the furniture without delaying occupying the building or interfering with the builder on the premises?

7. What kinds of school furniture may be termed truly functional for a functional building?

8. Discuss several of the more novel ways to supplement the dedication of new school building, as with displays, colored slides, school information, demonstrations of equipment, etc. Exhibit several of the more interesting brochures published in connection with new school openings.

9. Prepare a plan for introducing the school personnel to their new school plant.

10. What is the procedure in your state for final payment to contractors and closing of the school-construction account?

RELATED READINGS

DuFrain, Frank J.: "Accounting of School Properties," *American School Board Journal*, 106:20, March, 1943.

Engelhardt, N. L., and Fred Engelhardt: *Public School Business Administration*, Bureau of Publications, Teachers College, Columbia University, New York, 1927.

Hamon, Ray L.: "Needed Research in the School-plant Field," *Review of Educational Research*, National Education Association, 18:5–12, February, 1948.

Heinritz, Stuart F.: *Purchasing*, Prentice-Hall, Inc., Englewood Cliffs, N.J., 1947.

Levin, Sol: "A Modern Realistic Equipment Procurement Plan," *American School Board Journal*, 133:34–36, November, 1956.

———: *A Selected Bibliography of Business and Plant References for the School Administrator*, Bulletin 16, Association of School Business Officials, Kalamazoo, Mich., 1953.

Linn, Henry H.: *Practical School Economics*, Bureau of Publications, Teachers College, Columbia University, New York, 1934.

———, (ed.): *School Business Administration*, The Ronald Press Company, New York, 1956.

"School Plant and Equipment," *Review of Educational Research*, National Education Association, vol. XXI, no. 1, February, 1951.